

Included in this paper are keys to all currently recognized species assigned to sections *MENIOCUS* and *PSILONEMA*. In the main, all specimens seen have been cited, with the exception of the very widespread and common taxa, such as *Alyssum linifolium* or *A. alyssoides*. The specimen citations of these two species, as examples, from many areas in Europe could easily number several hundreds. In such cases I have cited only a few representative specimens; in most large herbaria, however, there will be found abundant additional material. Although I have omitted specimen citations for common European species, the citations of specimens of these taxa from the countries of the Near East are as complete as possible since floristic studies of the Near East are still in the explorative stages. This policy will be followed also in further papers on *Alyssum*.

The abbreviations for herbaria given by Lanjouw and Stafleu (eds.), *Index Herbariorum*, ed. 5 (*Regnum Vegetabile* 31, 1964) are used in this paper. Several not listed in an earlier paper (*Jour. Arnold Arb.* 45: 58, 60, 1964) are given here.

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I. Section *MENIOCUS* (Desvaux) Hooker

KEY TO ALL SPECIES OF SECTION *MENIOCUS*

- A. Fruits glabrous, smooth, without setae or papillae.
- B. Seeds wingless; styles 0.1–0.5 mm. long; petals 1–2(–2.4) × 0.5 mm., pale yellow. 1. *A. linifolium*.
- B. Seeds winged (wings 0.1–0.4 mm. wide); styles 0.5–1.8 mm. long; petals (1.5–)2–6.5 × 1.5–2 mm., gold.
- C. Styles 0.5–1 mm. long; petals entire, (1.5–)2–3.5 mm. long; leaves ca. 1.5 mm. wide, ± conduplicate. 2. *A. meniocooides*.

- C. Styles 1–1.8 mm. long; petals retuse or bilobed, 4–6.5 mm. long; leaves generally 2–4 mm. wide, always flat. 3. *A. aureum*.
- A. Fruits setose, at least on margins, and often papillose.
- D. Styles more than 1.5 mm. long; petals deeply bilobed (sinuses 1.5–3.5 mm. deep), or retuse; sepals 2–3.5 mm. long.
- E. Fruits elliptic, or obovate, (4–)5–7 mm. long, obtuse, setae (0.5–1 mm. long) and papillae always present and dense; seeds wingless; petals deeply bilobed. 5. *A. stylare*.
- E. Fruits orbicular or ovate, 3.5–5.5 mm. long, emarginate (rarely obtuse) or truncate, setae (0.2–0.5 mm. long) sparse on face of valves, or if only on margins then papillae always present; seeds winged, (wings 0.2–0.3 mm. wide); petals retuse. 7. *A. blepharocarpum*.
- D. Styles less than 1.5 mm. long; petals shallowly bilobed (sinuses 0.3–0.5 mm. deep) or emarginate; sepals 1–2 mm. long.
- F. Petals shallowly bilobed, 2–4 mm. long; seeds winged (wings 0.1–0.2 mm. wide); sepals deciduous; leaves increasing in size upwards; fruits broadly elliptic to orbicular, obtuse or truncate; inflorescence spreading, more than 5 cm. long. 4. *A. huetii*.
- F. Petals emarginate, (0.7–)1–1.5 mm. long; seeds wingless; sepals \pm persistent; leaves decreasing in size upwards; fruits narrowly elliptic or obovate, acute or attenuate; inflorescence compact and dense, 5 cm. or less. *A. heterotrichum*.

1. *Alyssum linifolium* Steph. ex Willd. Linn. Sp. Pl. ed. 4. 3(1): 467. 1800(!). — Benth. Fl. Austral. 1: 71. 1863. — Boiss. Fl. Or. 1: 286. 1867. — Ruprecht, Fl. Caucasi. 105. 1869. — Willk. & Lange, Prodr. Fl. Hisp. 3: 834. 1880. — Brandza, Fl. Rom. 136. 1883. — Cosson, Comp. Fl. Atl. 2: 239. 1887. — Fedtschenko, Fl. Turkest. 1: 47. 1906. — Bornm. Verh. Zool.-Bot. Ges. Wien 60: 74. 1910. — Hayek, Prodr. Fl. Penin. Balc. 1: 437. 1925. — Jávorka & Csapody, Ic. Fl. Hung. pl. 211, fig. 1589. 1930. — Post & Dinsmore, Fl. Syr., Palest. & Sinai, ed. 2. 1: 89. 1932. — Krause, Ankarantin Floru 73. 1934. — Thiébaud, Fl. Lib.-Syr. 1: 72. 1936. — Heywood, Repert. Sp. Nov. 64(1): 54. 1961. — Quezel & Santa, Nouv. Fl. Algér. 1: 410. 1962. — Rech. Ark. Bot. 5(1): 169. 1963. — Dudley in Rech. Fl. Lowland Iraq 307. 1964. — Ball & Dudley in Flora Europaea 1: 299. 1964. Syntypes Crimea and Caucasus, Tauria et Armenia, *Stephan s.n.* (B, non vidi). Lectotype, Tauria, *Stephan s.n.* (B, non vidi); isoelectotype (G-DC).

Annual, with many erect, ascending or rarely prostrate stems. *Leaves* linear and lanceolate (5–)8–10(–25) \times (0.5–)1–2.5 mm.; the lower gradually attenuate, the upper short petiolate. *Sepals* 1.2–2 mm. long. *Petals* only slightly longer than sepals, 1.2–2.4 mm. long, emarginate, and pale yellow to whitish. *Long filaments* unidentate, 1–1.5 mm. long. *short filaments* 0.8–1.5 mm. long; appendages 0.3–0.4 mm. long. *Fruits* obovate or broadly elliptic, obtuse, 3.5–7 \times 2–4.5 mm., glabrous; locules 4–6(–8)-ovulate. *Styles* 0.1–0.5 mm. long. $2n = 14–16$. *Fl.* Feb.–July. Two varieties are recognized.

- A. Plant erect; stems stout, greenish; indumentum of stellate hairs with few and long rays; fruiting racemes elongate, multi-branched, 3–7 cm. long; leaves $10\text{--}25 \times 1\text{--}2.5$ mm. a. Var. *linifolium*.
 A. Plant reduced; stems slender, grayish; indumentum of stellate hairs with few or many, short rays; fruiting racemes condensed, rarely branched, 1–3 cm. long; leaves $5\text{--}8 \times 0.5\text{--}1.3$ mm. b. Var. *teheranicum*.

a. Var. *linifolium*.

Meniocus serpyllifolium Desv. Jour. Bot. 3: 173. 1814, *nomen nudum* — non *Alyssum serpyllifolium* Desf. 1798.

Alyssum linearifolium LaGasca, Gen. & Sp. Pl. 19. 1816. (!). Holotype, Spain, locis ardis prope Moxente oppidum Regni Valentini, *LaGasca* 146 (MA, non vidi); isotype (G-DC).

Meniocus linifolius (Steph. ex Willd.) DC. Syst. Nat. 2: 325. 1821 (!); DC. Prodr. 1: 165. 1824. — Delessert, Ic. Select. Pl. 2: 13. *tab.* 42. 1823. — Meyer in Ledebour, Fl. Alt. 3: 45. 1831; in Ledebour, Fl. Ross. I: 134. 1842. — Mora, Fl. Fan. Esp. & Portugal 6: 572. 1873. — Colmeiro, Pl. Penin. Hisp.-Lusit. 157. 1885. — Busch in Kuznet., Busch & Fomin, Fl. Cauc. Crit. 3(4): 607. 1909; Fl. Sibir. & Orient. Extr. 6: 558. 1931; in Fl. U.R.S.S. 8: 359. 1939. — Cadevall & Sallent, Fl. Catal. 1: 147. 1915. — Popov, Man. Fl. Tashkent, fasc. 1 & 2. *fig.* 222. 1923–1924. — Fedtschenko, Fl. Ross. Austro-Orient. 5: 441. *pl.* 389. 1931. — Grossh. Fl. Kavk. ed. 2. 4: 220. *tab.* 25, *fig.* 7. 1950. — I. V. Pavlov (Ed.), Fl. Kazakhstan 4: 282. *tab.* 35, *fig.* 12. 1961.

Meniocus australasicus Turcz. Bull. Soc. Nat. Moscou 27(2): 297. 1854 (!). Holotype, West Australia, Nova Hollandia, collection no. 4, *Drummond* 127 (LE, non vidi); isotypes (BM, G, GH, K, OXF, W).

DISTRIBUTION AND HABITAT: a common and widespread weed of ruderal and cultivated lands, roadsides, vineyards, sandy and conglomerate hillsides, gravelly plains, steppe, Macchie, calcareous and gypsum outcrops throughout most of central, western, and southern Europe, North Africa, and the Middle East, Caucasia, and extending east to Afghanistan and Pakistan, and north to Siberia; alt. 50–2700 m. Naturalized and relatively common in New South Wales of Australia.

Spain. Valley of Segura, *Bourgeau* 577 (E, G, GH, K, W); Cerros del Reagajal, nr. Aranjuez, 600 m., *Font Quer & Gros* 26 (BM, E, G, GH, K, W); Prov. Teruel, Sierra de Valanche, *Reverchon s.n.* (E); Prov. Almeria, Muria, 1200 m., *Reverchon* 851 (E, W); nr. Cazorla, 1200 m., *Reverchon s.n.* (W). North Africa. Oran, Plateau le Kreider, 1000 m., 17 Apr. 1911, *Faure* (E); Oran, *Warion s.n.* (E). Russia. Crimea, 1816, *Bieberstein* (G-DC); Tauria, 1820, *Steven* (G-DC); Crimea, *Busch s.n.* (W); Odessa, 1846, *Nordmann* (K); *ibid.*, *Rehmann s.n.* (E) Podolia, 1820, *Andrezejowski* (G-DC); Podolia, *Besser s.n.* (K, W); Illyria, *Willdenow s.n.* (G-DC); Russian Armenia, Talin, Karmrashen (Karaburun)-Ashnak, 9 June 1959, *Aslanian & Karpaetian* (W); Mt. Bogutli, nr. Alages (Aragots), *Lagowski s.n.* (GH); Caucasus, *Callier* 539 (BM, K, W); *ibid.*, *Callier* 4211, 258 (G); Daghestan, 1874, *Becker* (K, W); Azerbaidjan, *Pichler* 150 (G); Transcaucasus, *Holmberg* 533 (W); *ibid.*, 800 m., 1888, *Conrath* (G); Tanaim, *Goldberg s.n.* (G-DC); Nachitschevan, Dzhulfa-Darosnan, 3 May 1934, *Karjagin* (A); *ibid.*, nr. Aliablast, 13 May 1934, *Grossheim & Gurvitsh* (K); Georgian Caucasus,

1831, *Hohenacker* (BM, K, W); *ibid.*, 1838, *Hohenacker* (G, K, W); Achabzich, *Radde* 412 (K); Prov. Elisabethpol, nr. Elisabethpol, Apr. 1900, *Fedossejew* (A, G, W); Prov. Fergana, dist. Kokand, S. of Kanibadam, 1913, *Minkwitz* (GH); Kurtuk, Kurtu river, 12 May 1930, *Serowa & Ryschowa* (A); Kirghiz S. S. R., Prov. Semirechensk, dist. Pishpek, Atbashansk, Chu river, *Tsintserling* (A, GH); Siberia, Suddagh, *Pallas s.n.* (BM); Uskut, *Pallas s.n.* (BM); Dauria, nr. Astracan, 1819, *Fischer* (G-DC); *ibid.*, 1828, *Prestcott* (K); Songarei, 1831, *Schrenk* (G, GH, W); Siberia, 1819, *Sprengel* (G-DC); Catherinoslavo, Borysthene nr. Alexandrovsk, 1865, *Grüner* (BM); Altai, *Ledebour* 329 & *Meyer* 46 (W).

Romania. Basarabia, dist. Ismail, nr. Satu, 2-10 m., *Borza* 654 (E). **Turkey.** A3: Prov. Ankara, NW. of Beypazari-Nallihan, *Kühne* 395 (STU); Kirzbepe, *Kühne* 730 (STU). A4: Prov. Kastamonu, Seker-Köprü (Kure-Kastamonu), 1892, *Sintenis* 3773 (G, K, W). A5: Prov. Amasya, Amasya, 400-600 m., 1889, *Bornmüller* 1340 (E, K, W). A6: Prov. Tokat, Tokat, 600-700 m., 1893, *Bornmüller* 3244 (G, K, W). A7: Prov. Gümüşane, Bayburt-Gümüşane, 1700 m., *Stainton* 8222 (E). A8: Prov. Gümüşane, Gümüşane, *Bourgeau* 39 (W). A9: Prov. Kars, Kağızman-Tuzluca, *Sauer* 269 (E, ISTF); Tusuz, 1800 m., *Davis* 29576 (A, BM, E, K). A/B8: Prov. Erzurum/Gümüşane, Bayburt-Erzurum, 1853, *Huet* (E, G). B1: Prov. Manisa, Sipyli (Manisadağ), 700-900 m., *Bornmüller* 9070 (G, W). B2: Prov. Uşak, Ouchak (Uşak), 910-940 m., *Balansa* 1251 (BM, E, G, GH, K, W). B3: Prov. Eskisehir, Eskisehir, *Turkish Sugar Co.* 475, 477 (BM, E); Prov. Afyonkarahissar, dist. Emirdağ-Bolvadin, 10 km. S. of Emirdağ, 1100 m., *Huber-Morath* 13726 (E, HM). B4: Prov. Ankara, Ankara nr. Judyie, 385 m., 1929, *Bornmüller* 13853 (BM, G); Ankara, *Frères E. C.* 244 (G); 13 Apr. 1958, *Kühne* (STU); *Merton* 3279, 3286 (E, K); *Görz* 15 (BM, G); Prov. Konya, Yavşan Memlehasi nr. Tuz gölü, *Davis* 18691, 31807 (BM, E, K); Prov. Niğde/Konya, 4 km. from Halkenli köy, W. side of Tuz gölü, 1000 m., *Dudley, D.* 35928 (E). B5: Prov. Kayseri, plaine de Césarée (Kayseri), 1107 m., *Balansa* 990 (E, G, GH, K, W). B6: Prov. Maraş, Elbistan, 1500 m., *Davis* 27642 (A, BM, E, K). B7: Prov. Elâziğ, Egin (Kemaliye), June 1853, *Huet* (G, W). B8: Prov. Erzurum, Erzurum, June 1853, *Huet* (G); *Zohrab* 376 (K). C2: Prov. Antalya, Elmali-Korkuteli, 5 miles from Elmali, 1120 m., *Dudley, D.* 35211 (E). C3: Prov. Burdur, Burdur, May 1845, *Heldreich* (BM, E, K, G, W); Prov. Konya, Konya-Beyşehir, 4 km. from Beypazari, *Dudley, D.* 35840 (E). C4: Prov. Konya, Konya-Sultanhanı, 18 miles from Konya, 1050 m., *Dudley, D.* 35918a (A, E); Çumra distr., Küçük köy, *Helbaek* 2557 (E); Niğde, Ala dağ, nr. Çukur dağ, 1900-2060 m., *Parry* 64 (E). Additional Turkish specimens: *Huber-Morath* 10990, 12817, 13721, 13724, 14803 (HM); *Dudley, D.* 35957, *D.* 35840 (E); Caria, *Kirk s.n.* (E); Lycia, Sorkoon (?), *Forbes* 48 (K); Armenia, *Szowits s.n.* (G, GH, K, W); 1867, *Calvert & Zohrab* (E, G, K); *idem* 45, p.p. (OXF). **Syria.** Quarryatein, *Davis* 5726B, 5602 (E, K); Quarryatein-Rat Tush, *Davis* 5634 (E, K); *Russell s. n.* (BM, G-DC). **Palestine.** Wadi Musa-Moan (Transjordan), 1219 m., *Davis* 8691 (E, K); Plaine de Amalites, Apr.-May 1846, *Boissier* (G); Ain-Musa, 16 Apr. 1929, *Eig et al.* (G, W); 20 km. S. of Moan, 18 Apr. 1923, *idem* (G, W); Wadi Hasá-Ain Musa, 17 Apr. 1929, *idem* (G, W); Kal. Hasa-Kal. Anezé, 17 Apr. 1929, *idem* (G, W). **Syria/Iraq.** Aleppo-Mosul, *Oliver s.n.* (G-DC). **Iraq.** Baqubak, *Rogers* 45, p.p. (K); Jarmo, *Helbaek* 306 (K); Jazira, 20 km. NW. of Falija, *Guest & Rawi* 13649 (K); Mosul-Kirkuh, *Guest* 625 (K); Karbala liwa, ca. 15 km. W. of Karbala, *Gillett & Rawi* 6375 (K); 18 km. S. of Rutba, 640 m., *Rawi* 14634 (K); Thukhaib, 280 m., *Rawi* 14795 (K); 50 km. E. of Samarra, Asila, 10 km. N. of Shaikh

Mohamma, 50 m., *Rawi* 20480 (κ); *ibid.*, *Rechinger* 13452 (w); 4 km. E. of Samarra, 65 m., *Rawi* 20329 (κ); *ibid.*, *Rechinger* 13500 (w); Truleal-e-Has, *Rechinger* 4330 (w); Mesopotamian desert, 15 Sept. 1919, *Watson* (κ); Oguhah, *Graham* 25 (BM); Euphrates, Meskare-Der-es-Sor, Sabcha-Tibne, 250–350 m., *Handel-Mazzetti* 542 (w); Kaijum-Abukenal, 120–180 m., *Handel-Mazzetti* 652 (w); Mejadin-Salbije, 180 m., *Handel-Mazzetti* 632 (w); Assyria, Kerkcik, 1893, *Bornmüller* 894 (G); Jabal Hamrun, Muqdadija (Sharaban)-Jalaula, *Rechinger* 14212 (w). Iran. Prov. Khorasan, Turbat-e-Haidari, 1300 m., *Rechinger* 4346 (G, w); *ibid.*, ca. 30 km. from Meshhed, *Rechinger* 1502 (w); Mt. Kopet Dag, nr. Alamli, 2000 m., *Rechinger* 4670, *p.p.* (w); Djenaran-Kucan, *Rechinger* 7519, *p.p.* (w); Schiras-Kamareyi, 200–600 m., Apr. 1868, *Hausknecht* (BM, G); Sultanabad nr. Kaswin, 1524 m., *Lindsay* 29, 32 (BM); Transcaspian, 1900, *Sintenis* 165 (G, κ, w); 10 km. E. of Zorab, 1667 m., *Cowan & Darlington* 1615 (κ); Prov. Hamadan, Kharaghan (Hamadan), *Sabeti* 94 (w); Faghire nr. Hamadan, *Sabeti* 225 (w); Aq Bulaq, ca. 100 km. N. of Hamadan, *Rioux & Golvan* 210, 213 (w); Mt. Elburs, Demawend, 2640 m., 22 July 1936, *Gilli* (w); Keredj, *Rechinger* 526 (w); *ibid.*, 27 Apr. 1934, *Gaub* (w); Mazanderan, Bashm Kuh (Shahmirzad), N. of Baslm, 2700 m., *Wendelbo* 1341 (BG, E); Haraz valley, W. of Siah Bisheh, 700 m., *Wendelbo* 428b (BG, E); Bakhtiari, Oregon, Damane-Kuh, 2300 m., *Wendelbo* 1727 (BG, E); Kerman, Kerman-Saidabad (Sirdjan), Mashiz-Khan-e-Sorck, 2000–2580 m., *Rechinger* 3051 (E, G, κ, w); Mt. Djamal Bariz, Bam-Djiroft, Deh Bakri, 2100 m., *Rechinger* 3805 (G, κ, w); Rescht-Teheran, Ruiobar-Mendschel, 300–400 m., 1902, *Bornmüller* 6243 (G). Kuwait. Shaiba, 23 Aug. 1919, *Watson & Sharples* (κ). Afghanistan. Hari-rud valley, *Aitchison* 160, 430, (GH, κ); Istalif, 1800–1840 m., *Gilli* 1087, *p.p.*; 1088 (w); Kamardtal, W. of Duab, 1630 m., *Gilli* 1078 (w); Prov. Kabul, Chord Kabul, E. of Kabul, 2280 m., *Gilli* 1090 (w); Koh-i-Asmir, 1900 m., *Wendelbo* 2733 (BG); ca. 15 km. W. of Sarobi, 1100 m., *Wendelbo* 2791 (BG); Sarobi, *Volk* 2454 (w); 20 km. E. of Lataband, 1800 m., *Wendelbo* 3022 (BG); Qual-e-Eslan, 25 km. S. of Kabul, 1830 m., *Wendelbo* 3204 (BG). Pakistan. North-West Frontier, Parachinar, Kurram Valley, 2134 m., *Stewart* 28117 (MICH); *Stewart* 14738 (κ); Peshin, 1550 m., *Lace* 3308 (E, κ); Murqudochen, *Stokes* 942 (κ).

Specimens intermediate between the two varieties are known to occur in Afghanistan: Otipore, Chokey and Korobat, *Griffith* 1519, ex hb. Lehmann (κ); *Griffith* 1415 (GH).

Alyssum linifolium is one of the most widespread species in the genus, and is quite variable in the size of its leaves and fruits, and in its stature. However, with the exception of the variety which follows (var. *teheranicum*), the minor variations do not warrant nomenclatural recognition. One interesting variation occurs on plants (e.g. *Davis* 18691 and *Dudley*, *D.* 35928) growing in extreme saline habitats. The leaves of these plants are very narrow and conduplicate, resembling those of *A. menioides*. This character, however, is not constant, for the plants assume a normal appearance immediately outside the salt areas.

The closest allies of *Alyssum linifolium* are *A. menioides* and *A. aureum*, both of section MENIOCUS. From these, *A. linifolium* may be easily distinguished by its wingless seeds, much shorter styles, and smaller floral parts.

Professor Zohary (Palest. Jour. Bot. Jer. ser. 2(2/3): 162. 1941) maintains that *Alyssum minimum* L. (Sp. Pl. 2: 651. 1753) is the correct binomial for this species, and that *A. linifolium* is a synonym. Examination of Linnaeus's specimen of *A. minimum* (LINN. 828:8) proves without any doubt that this is not the case; *A. minimum* L. can only be treated as a synonym of *Lobularia maritima* (L.) Desv. (Basionym: *Clypeola maritima* L. Sp. Pl. 2: 652. 1753). *A. minimum* sensu Willd. (Willd. Linn. Sp. Pl. ed. 4. 3(1): 464. 1800) clearly is not the same taxon as *A. minimum* L., but may be identified rather as *A. desertorum* Stapf.

- b. Var. *teheranicum* Bornm. Bull. Herb. Boiss. II. 4: 1269. 1904 (!). — Parsa, Fl. Iran 1: 746. 1952. Holotype, Iran, in vallis oppidi Teheran, 1150 m., 20 Feb. 1892, *Bornmüller 2155* (B, non vidi); isotypes (BM, E, G, K, OXF, W).

Alyssum (*Meniocus*) *cupreum* Freyn & Sint. Bull. Herb. Boiss. II. 3: 695. 1903 (!). — Fedtschenko, Fl. Turkest. 1: 47. 1906. Holotype, Russia, Regio Transcaspica, Krasnowodsk in arenosis montium, 17 Mar. 1900, *Sintenis 18* (BRNU, non vidi); isotypes (BM, E, G, K, W).

Meniocus linifolius f. *microcarpus* Busch in Kuznet., Busch & Fomin, Fl. Cauc. Crit. 3(4): 610. 1909. Holotype, Russian Armenia, in tractu Bortschalo in Somchetia, 1837, *Koch 143* (LE, non vidi).

Alyssum linifolium var. *cupreum* (Freyn & Sint.) Dudley in Hedge, Årbok Univ. Bergen, Mat.-Naturv. No. 13: 6. 1963 (!).

DISTRIBUTION AND HABITAT: scattered in extreme steppic conditions, loose gravel, dry limestone hillsides, desert, and serpentine substrates of Turkey, Syria, Iraq, Iran, Caucasia, Azerbaidjan, Afghanistan and Pakistan; alt. 200–2000 m.

Turkey. A2 (E): Prov. Istanbul, Rumel Hissar, 16 May 1915, *Post* (G). A4: Prov. Ankara, Çubuk, 1000 m., *Markgraf* (Z). B4: Prov. Ankara, 7 Apr. 1958, *Kühne* (STU). C4: Prov. Konya, Agios Philippos (Hagios Philippos), *Post 15* (G). C5: Prov. Niğde/Adana, Ulukişla-Pozanti, 900 m., *Davis 26300* (BM, E, K). Cappadocia, 1834, *Montbret* (K). Asia Minor, *Aucher 280* (G, K); *ibid.*, *Aucher 4100* (BM, G, K, W). Syria. Palmyra, 200 m., *Dinsmore 22497* (K). Iraq. Dist. Kiruk (Kurdistan), ad confines Persiae, Khanaquin, *Rechinger 14128* (W); Mosul, 200 m., *Bugloss 8* (K). Iran. Prov. Teheran, Kishlak (Garmsar), Seman-Teheran, 900 m., *Rechinger 2773b* (W); nr. Teheran, 1220 m., 1892, *Bornmüller 2154* (E, G, K, W); *ibid.*, *Schmid 5102* (G); Kom, 1892, *Bornmüller 2153* (G); Chononsar, 1900 m., 1892, *Bornmüller 2151* (G, K, W); *Bornmüller 2156* (BM, E, G, K, OXF, W); Teheran-Davudieh hills, 1400 m., *Wendelbo 97a* (BG, E); Persepolis, *Kotschy 1053* (G, W); S. of Tabriz, *Gilliat-Smith 1351, 1352, 1336, 1338* (K); 39 km. W. of Kermanshah, 1372 m., *Cowan & Darlington 2618* (K); Shersah, Mar. 1859, *Bunge* (G, K); Kerind, *Evans 37* (E); Prov. Kazvin, Keredj, nr. Kalak, 1600 m., *Rechinger 2745* (G, W); Mt. Elburs, Keredj-Kalak, *Rechinger 143* (W); Prov. Isfahan, Kuh Pah, 1700 m., *Rechinger 2714* (W); Abadeh-Daulatabad, 1500–2000 m., *Schmid 5313, 5318* (G); Fars, Takht-i-Jamshed, *Koelz 14420* (E, W); Prov. Khorasan, Robat Safid, 1800–2000 m., *Rechinger 7335* (W); Mazanderan, Haraz valley above Panjab. 1300 m., *Wendelbo 303* (BG, E); Prov. Baluchistan, Khash (Vasht)-Iranshahr

(Bampur), Mt. Karvandar, 1500–1600 m., *Rechinger 3958* (w). **Russia.** Azerbaidjan, Zelizabethpol (Elizavetpol), 1882, *Pichler* (g, GH, w); Krasnowodsk, 1900, *Sintenis 17* (E, G, K); 1900, *Sintenis 19* (G). **Afghanistan.** Kabul-Paghman, 1880–1910 m., *Gilli 1089a, 1089b* (w); Kabul, Scher Darwasah, 1790–1840 m., *Gilli 1081, 1082, 1083, 1085* (w); *ibid.*, *Neubauer 537* (w); *ibid.*, Koh-e-Tschelsotun, 1810 m., *Gilli 1084* (w); Kabul, *Gilli 1091* (w); E. of Kabul, Budchak, 1770 m., *Gilli 1080* (w); Dschmal Baba, S. of Kandahar, 1000 m., *Gilli 1077* (w); Kodananebene-Istalif, 1750 m., *Gilli 1079* (w); Istalif, 1800 m., *Gilli 1087, p.p.* (w); Sarobi, *Volk 2455, p.p.* (w); Pule Surkh nr. Tsharikar, *Neubauer 542* (w); nr. Kabul, NW. of Aliabader Mt., 1800 m., *Gilli 1086* (w); *ibid.*, *Collett 12* (K). **West Pakistan.** Quelta, Kitta Aboulla, *Duthie 8577, 8578* (G, K).

The differential characters of *Alyssum linifolium* var. *teheranicum* are consistent in small and scattered populations throughout the southeastern range of the species. The type specimens of var. *teheranicum* are morphologically identical to those of *A. cupreum*, the latter name is, therefore, placed in synonymy. Bornmüller used yet another varietal name for this taxon in *exsiccatae*, but without a Latin description. This epithet referred to the dense, metallic-colored indumentum.

2. ***Alyssum meniocoides*** Boiss. Ann. Sci. Nat. Paris II. 17: 158. 1842 (!). — Boiss. Fl. Or. 1: 286. 1867. — Handel-Mazzetti, Ann. Naturh. Mus. Wien 27: 52. 1913. — Boul. Fl. Liban. & Syr. 32. pl. 38, fig. 11. 1930. — Post & Dinsmore, Fl. Syr., Palest. & Sinai, ed. 2. 1: 89. 1932. — Thiébaud, Fl. Lib.-Syr. 1: 72. 1936. — Parsa, Fl. Iran 1: 747. fig. 621. 1952. — Rech. Ark. Bot. 5(1): 170. 1963. — Dudley in Rech. Fl. Lowland Iraq 307. 1964. Holotype, Mesopotamia, *Aucher 281* (G); isotypes (BM, K, OXF).

Meniocus filifolius Jaub. & Spach, Ill. Pl. Or. 1: 107. tab. 53B. 1843 (!), non *Alyssum filifolium* Wahlenberg, 1826. (Cf. Dudley, Jour. Arnold Arb. 45(3): 372. 1964). Holotype, *Aucher 281* (P, non vidi); isotypes (BM, G [holotype of *A. meniocoides*], K, OXF).

Alyssum tetraspermum Bertol. Miscell. Bot. 2: 12. 1843 (!). Holotype, Turkey, C6: Euphrates, ex campis ad Portum William (S. of Birecik), Mar. 1836, *Chesney 25* (BOLO, non vidi); isotypes (BM, G, K).

Alyssum kermanshahensis Cowan ex Parsa, Fl. Iran 1: 733. fig. 607. 1952 (!). Holotype, Persia, 39 miles E. of Kermanshah, 1372 m., 29 Mar. 1929, *Cowan & Darlington 354* (K).

Annual, stems slender, 3–10 cm. tall. *Leaves* (5.5–)10–18 mm. long, ± conduplicate. *Petals* obovate, entire, (1.5–)2–3.5 mm. long. *Long filaments* 1.5–2 mm. long, terminated with bifid apices 0.3–0.4(–0.5) mm. long. *Short filaments* 1–1.5 mm. long, with always bifid appendages 0.5–1 mm. long. *Fruits* glabrous. *Styles* 0.5–1 mm. long. *Seed wings* 0.1–0.2 mm. wide. *Fl.* Feb.–Apr.

DISTRIBUTION AND HABITAT: fallow fields, steppe, limestone slopes, and sometimes associated with *Quercus aegilops* forests in Mesopotamia of

southeastern Turkey, the Syrian desert, Lebanon, Palestine, Iraq, Iran, and Afghanistan; alt. 100–2000 m.

Turkey. C6: Prov. Gaziantep, Aintab (Gaziantep), Apr. 1886, *Shepard* (GH, K); 10 Apr. 1884, *Post* (BM); Yonas, Euphrates, 25 km. E. of Gaziantep, 914 m., *Haradjian 1770a* (E, G, K, W); Bal Zus (Balkis) nr. Birecik, 1200 m., *Haradjian 1043* (G, W); Merza nr. Birecik, 1888, *Sintenis 131* (BM, E, G, K, W); Prov. Hatay, Amurk nr. Hassa, Amanus dağ-Kurt dağ, *Haradjian 889* (G, W). C7: Prov. Gaziantep, Rum Kala (Halfeti), 1888, *Sintenis 157*, approaching *A. aureum* (BM, E, G, K, W); Prov. Urfa, Djebel Taktak (Tektek dağ) Apr. 1867, *Hausknecht* (BM, K, W). C8: Prov. Mardin, Mardin, 1894, *Post* (BM, G). **Syria.** Isiayah, 1 Apr.–1 May 1900, *Post* (BM, G); Nebk, *Davis 5528*, approaching *A. aureum* (E, K); Dayr-'Atiyyah, *Post* (BM); *ibid.*, 1200 m., *Post 13815* (E, G, K); *ibid.*, May 1879, *Post* (BM); Aleppo, *Russell s.n.* (BM); *ibid.*, *Lesier 452* (E); *ibid.*, June 1867, *Hausknecht* (G, W); Turmanin nr. Aleppo, 1865, *Hausknecht*, *p.p.* with *A. aureum* (G, W); Jabul-Gourn, 950 m., *Dinsmore 19815* (G, K); Palmyra, 400 m., *Dinsmore 20497* (K); *ibid.*, Snoi-Teida, Djebel Abour, *Blanche 2887* (G); Damascus, Apr. 1928, *Druce* (OXF); *ibid.*, 14 Apr. 1894, *Péronin* (G); *ibid.*, Djebel Kharbi, *Gaillardot 1546* (G); *ibid.*, Saso-Kisive, 671 m., Feb. 1945, *Norris* (BM); 10–15 km. from Damascus, 503–914 m., 4 Mar. 1945, *Norris* (BM); nr. Baalbak, 12 Mar. 1867, *Fox* (K); Horms-Hama, 2000 m., *Haradjian 4099* (G); Armel Wir'al-Am'El Beidha, 8 Apr. 1890, *Post* (BM). **Palestine.** Busrah-Kurayyah, 900 m., *Dinsmore 2460*, approaching *A. aureum* (G, K); Moab-Qual'at Ziza, *Feinbrun & Zohary 327* (BM, E, G, GH, K, W); Amman-Ziza, 15 Apr. 1929, *Eig et al.* (G, W); Ziza, 700 m., *Dinsmore 11815* (E, G, K); Es-Salt-'Amman, Apr. 1895, *Post* (G); Umel Ammud, 15 Apr. 1929, *Eig et al.* (G, W). **Lebanon.** Wadi Karn, Yabrud (Zebrad), *Post 88* (G); Zeferya-Beyrout, 21 May 1881, *Péronin* (G); Beyrout plain, 100 m., *Maitland 70* (K). **Iraq.** Zawita, Mosul liwa, *Polunin et al. 47* (BM, E, G, GH, K); Hieropolis, Mar. 1867, *Hausknecht*, *p.p.* with *A. aureum* (G, K, W); Euphrates, Abu Herera, Meskene-Der-es-Sor, 205–350 m., *Handel-Mazzetti 424*, approaching *A. aureum* (W); Tuz Khurmatli, *Rogers 349* (K); Kirkuh, *Rogers 74* (K); Duleam liwa, 6 km. above Ana, 130 m., *Gillett & Rawi 6967* (K); Erbil liwa, Slahaddin, 1000 m., *idem 10423* (K); Suleimaniya liwa, Givija forest, 1100 m., *idem 10623* (K); L'Alders, 1919, *Hanna* (BM). **Iran.** Teheran, Davudieh hills, 1400 m., *Wendelbo 97b* (BG, E); distr. Kermanshah, Qualapoin, 22 km. E. of Kermanshah, 1280 m., *Bent & Wright 112*, *p.p.*, *125*, *p.p.* (W); 39 miles E. of Kermanshah, 1372 m., *Cowan & Darlington 256* (K); Prov. Luristan, Durud, *Koelz 17103* (E, MICH, W); Teheran, Farahabad, *Sabeti 182* (W); nr. Kaswin (Mazraeh), 1200 m., *Schmid 5050*, *5045* (G); *ibid.*, *Schmid 5055* (W); *ibid.*, *Stutz 711* (BRY, W). **Afghanistan.** Obeh, 1700 m., *Koie 3782* (W); Prov. Bamian, Danak Siakr, 10 km. from Doab, 1500 m., *Wendelbo 3418* (BG, E).

In collections containing both *Alyssum menioides* and *A. aureum* in Mesopotamia, the diagnostic characters of each remain quite clear, and *A. aureum* is still flowering when *A. menioides* has mature fruit. Although both species occasionally occur in the same population, neither has any apparent ecological or altitudinal preferences; however, *A. aureum* replaces *A. menioides* in central and eastern Anatolia. The petals of some specimens (e.g. *Sintenis 131* & *157*) approach in size those of *A. aureum*; likewise the leaves of these specimens are somewhat atypical

and more or less resemble those of *A. aureum*. In all other respects, however, these plants possess all the other characters of *A. meniocoides*. Collectors have frequently confused *A. meniocoides* with *A. linifolium*, which occurs commonly throughout the same geographical areas, but the former has winged seeds, longer styles, larger floral parts, and generally narrower and conduplicate leaves.

3. ***Alyssum aureum*** (Fenzl) Boiss. Fl. Or. 1: 286. 1867 (!). — Boul. Fl. Liban. & Syr. 32. 1930. — Post & Dinsmore, Fl. Syr., Palest. & Sinai, ed. 2. 1: 89. 1932. — Thiébaud, Fl. Lib.-Syr. 1: 72. 1936. — Rech. Ark. Bot. 5(1): 166. 1963.

Meniocus aureus Fenzl, Pug. Pl. Nov. Syr. & Taur. Occid. 1: 13. 1842 (!). Holotype, Syria, circa Aleppo, 22 Mar. 1841, *Kotschy 27* (w); isotypes (BM, E, G, GH, K, OXF).

Meniocus grandiflorus Jaub. & Spach, Ill. Pl. Or. 1: 105. tab. 53A. 1843 (!). Syntypes, *Kotschy 27* & *Aucher 4100* (BM, E, G, K, W). Lectotype, *Kotschy 27* (P, non vidi); isolectotypes (BM, E, G, GH, K, OXF, W).

Alyssum pleiospermum Fenzl, Ill. & Desc. Pl. Nov. Syr. & Taur. Occid. 54. 1843 (!). Holotype, *Kotschy 27* (w), isotypes (BM, E, G, GH, K, OXF).

Alyssum meniocoides var. *aureum* (Fenzl) Zohary, Pal. Jour. Bot. Jer. Ser. 2(2/3): 162. 1941 (!).

Annual, with stout stems, (3-)5-20 cm. tall. *Leaves* (8.5-)12-30 mm. long, and always flat. *Petals* golden, spathulate, retuse or bilobed, 4-6.5 mm. long. *Long filaments* 2-4 mm. long, wing terminated with lanceolate or bifid apex, 0.5-1 mm. long. *Short filaments* 2-3 mm. long with lanceolate or bifid appendages 1-1.5 mm. long. *Fruits* glabrous. *Styles* 1-1.8 mm. long. *Seed wing* 0.2-0.4 mm. wide. *Fl.* Mar.-June.

DISTRIBUTION AND HABITAT: dry cultivated lands, steppe and marly vineyards in Lycaonia, the Upper Euphrates region and Mesopotamia of Turkey, the Syrian desert of Western Syria and Palestine; alt. 400-2500 m.

Turkey. B6: Prov. Malatya, Derinje (Darende), 18 Apr. 1917, *McDaniels* (cu). B7: Prov. Erzincan, Sürek, 1890, *Sintenis 130b* (G); Prov. Elâziğ, Elâziğ-Kale, 22 km. E. of Elâziğ, 1300 m., *Davis 28938* (BM, E, K); Harput, *Noë 857* (G); Prov. Malatya, Malatya, 1000-2500 m., *Ajtaikovitch* (w); Arapkir-Denizli, 1889, *Sintenis 153* (E, w). C4: Prov. Konya, Ayos Philipos (Hagios Philippos), nr. Konya, *Post B16* (G); Çumra dist., Küçük köy, *Helbaek 2400* (E). C6: Prov. Gaziantep, Yonas, 25 km. E. of Gaziantep, 914 m., *Haradjian 1770b* (G). C7: Prov. Urfa, Djebel Taktak (Tektek dağ), Apr. 1867, *Haussknecht*, p.p. (BM). **Syria.** Turmainen nr. Aleppo, 396 m., 12 Mar. 1865, *Haussknecht*, p.p. with *A. meniocoides* (G, w); Aleppo, *Haussknecht 98* (G); Yab Sam, 400 m., *Dinsmore 20409* (G, K); Kalat, *Rogers 599b* (K); Djebel Muhassan, 12 Mar. 1863, *Haussknecht* (G); El Jebath-El Beithata, 11 Apr. 1890, *Post*, p.p. with *A. meniocoides* (BM); Haurân, *Post s.n.* (BM). **Palestine.** Amman-Ziza, *Eig & Zohary 1929* (HUJ); Amman-Abu Jaber, 1000 m., *Samuelsson 2838* (w). **Iraq.** nr. Mosul of Kirkuk, *Guest s.n.* (K); Baghdad nr. Kamaracha, 1822, *Olivier*

(G); Hieropolis, Mar. 1867, *Hausknecht*, p.p. with *A. meniocoides* (G, K, W); *ibid.*, 1782, *Michaux* (G).

The species *Meniocus pleiospermum* and *M. grandiflorus* are based on the same type material (*Kotschy* 27) as *M. aureus*, the basionym of *Alyssum aureum*. The other syntype of *M. grandiflorus* (*Aucher* 4100) is correctly referred to *Alyssum linifolium* var. *teheranicum*.

Zohary (*Pal. Jour. Bot. Jer. Ser.* 2(2/3): 162. 1941) considered that the differences between *A. aureum* and *A. meniocoides* were very slight, and recombined *A. aureum* as a variety of the latter species. *A. aureum* may be distinguished from *A. meniocoides* by its considerably longer styles, larger and retuse or bilobed petals, larger fruit, and usually flat and wider leaves. Although the distinction in petal size and leaf form occasionally breaks down (cf. note under *A. meniocoides*), the much longer styles, and the always retuse or bilobed petals remain diagnostic for *A. aureum*. Furthermore, these species retain their identity in regions of overlap, and they clearly have different flowering times.

The inclusion of *A. aureum* by Parsa (*Fl. Iran* 1: 747. fig. 622. 1952) is probably an error. With the exception of this reference, *A. aureum* has not been recorded from Iran, and no Iranian specimens have been seen at Kew, upon whose collections Parsa based his work. These materials, and Parsa's illustration lead me to conclude that *A. aureum* sensu Parsa is, in fact, *A. minutum*.

4. *Alyssum huetii* Boiss. *Fl. Or.* 1: 287. 1867 (!). Syntypes, Turkey, 11 May 1869, *Bourgeau*; *Balansa* 1252, *Kotschy* 206, and June–July 1853, *Huet*. Lectotype, Turkey, B8: Prov. Erzurum, in neglectis circa Erzurum, 1829 m., June–July 1853, *Huet* (G); isolectotypes (BM, K, OXF).

PL. II, FIGS. i, s. PL. III,
FIG. a. PL. IV, FIG. b.
TEXT-FIG. 1.

Meniocus hirsutus Boiss. & Bal. in Boiss. *Diagn.* 3(5): 32. 1856 (!), non *Alyssum hirsutum* Bieb. Holotype, Turkey, B2: Prov. Uşak Ouchak (Uşak), 910–940 m., 21 May 1857, *Balansa* 1252 (G); isotypes (BM, GH, K, OXF, W).

Annual, with ascending or erect stems up to 40 m. *Leaves* linear or oblanceolate, (8–)30–40 × (0.5–)2–3 mm., ± conduplicate, acute, increasing in size upward. *Racemes* simple, or rarely branched, (5–)10–20 cm. long. *Pedicels* spreading to horizontal, 4–6 mm. long. *Sepals* early deciduous, 1.7–2 mm. long, acute. *Petals* obovate-clavate, shallowly bilobed, (2–)3–4 × 1 mm. *Long filaments* 2–2.5 mm. long, with unilateral wings and teeth (teeth 0.5 mm. long), never exceeding anthers. *Short filaments* 1.2–1.5 mm. long with connate, lanceolate and acute, or bifid appendages, as long or longer than filaments. *Fruits* elliptic or orbicular, obtuse or truncate, 4.5–6.5 × 3–3.5 mm., papillose with ± sparse, slender

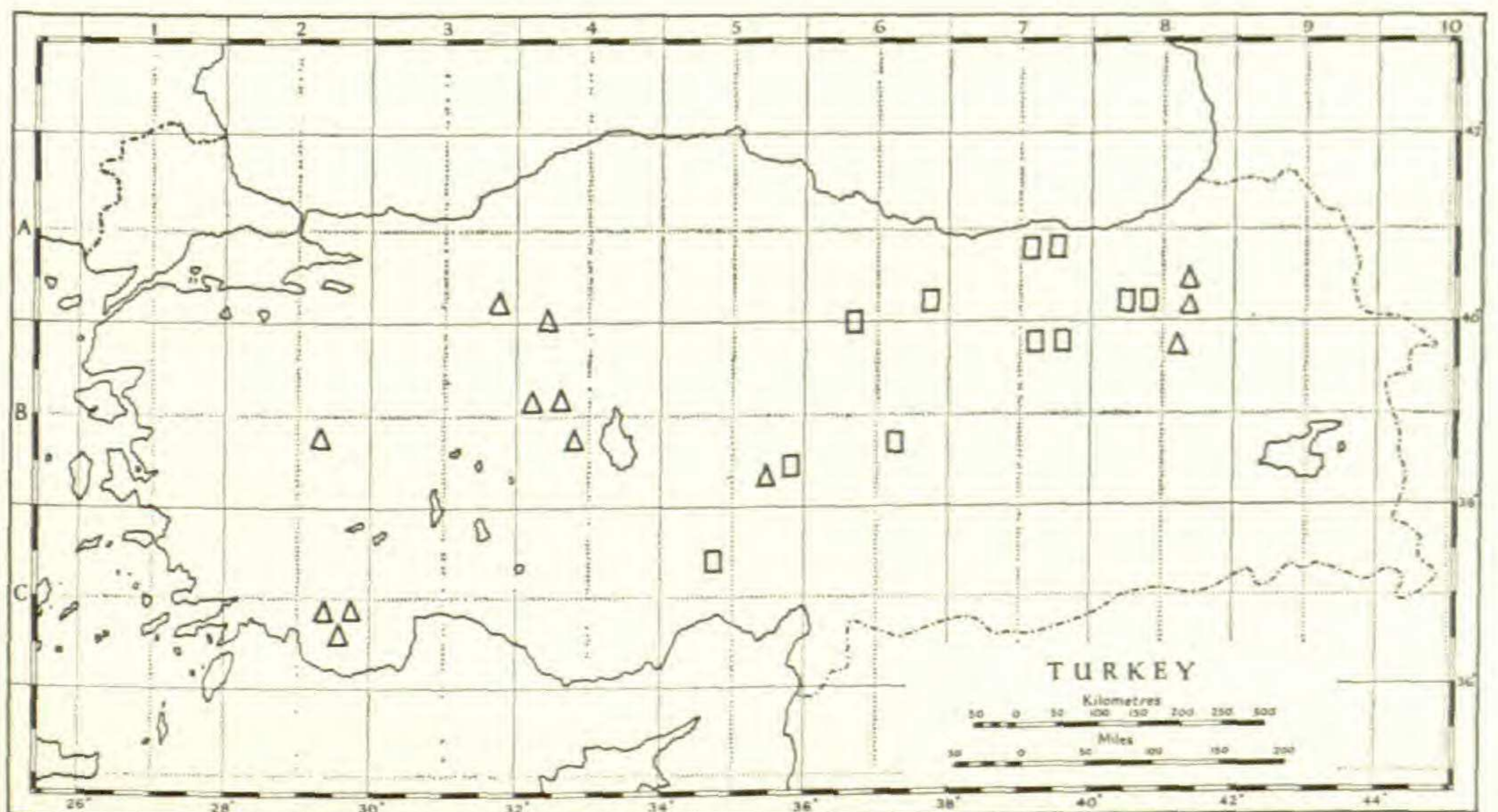
and simple tuberculate setae (0.3–0.5 mm. long); locules 4–6-ovulate. *Styles* stout, 0.5–1 mm. long, \pm dilated basally. *Seeds* narrowly winged. *Fl.* May–June.

DISTRIBUTION AND HABITAT: an Anatolian endemic of disturbed sites, cultivated lands and steppe, scattered mainly in Inner Anatolia, from western, southwestern and central Turkey, and extending east to the Armenian Highlands; alt. 800–2500 mm.

Turkey. A3: Prov. Ankara, 10 km. W. of Beypazari, 2 km. W. of Zaviye, 1000 m., *Kühne* 202 (STU). A8: Prov. Erzurum, Tortum, *Calvert* 1240 (G). A/B4: Prov. Ankara, nr. Indize-su, 800–900 m., 1929, *Bornmüller* 13853 (BM, GH, K, W). B4: Prov. Ankara, Ankara, *Kotte* 1021 (K); Hussein nr. Ankara, *Kotte* 121 (K); dist. Haymana, 9 km. W. of Haymana, 1808 m., *Huber-Morath* 13723 (HM). B5: Prov. Kayseri, Argaei (Erciyas dağ) nr. Tpshamaki, 1600–2500 m., *Kotschy* 206 (G, W). B8: Prov. Erzurum, Erzurum, *Calvert & Zohrab* 1240 (E, G, K, OXF, W). C2: Prov. Anatolia, Elmali dağ, 11 May 1869, *Bourgeau* (E, GH, OXF, W); Elmali-Korkuteli, 5 km. from Elmali, 1100–1120 m., *Dudley, D.* 35212 (E) & *Dudley, D.* 35230 (A, E).

The closest ally to *Alyssum huetii* in Turkey is probably *A. stylare*, which is also an Anatolian endemic. It may be distinguished from *A. stylare* by its shorter and stouter styles, smaller floral parts, and sparser fruit indumentum of shorter and slender setae, and papillae. It is also closely related to *A. heterotrichum* from Iran and Russia.

The fact that the vast area of east-central Anatolia has been little collected probably accounts for the absence of records or specimens of *A. huetii* from that area, which intervenes between the presently known areas of distribution of this species.



TEXT-FIG. 1. Map showing distribution of *Alyssum huetii* (Δ), and *A. stylare* (□), in Turkey.

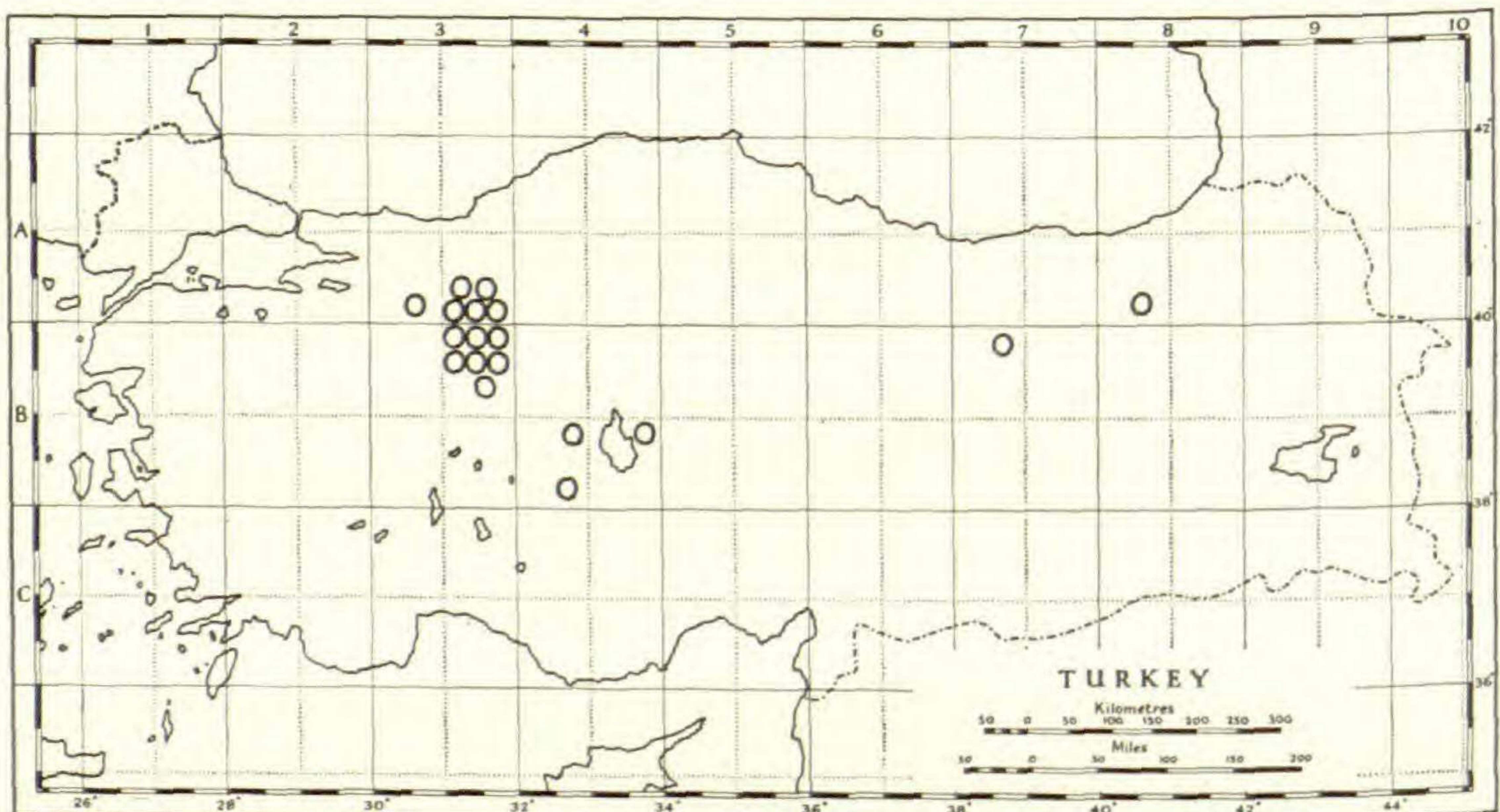
5. *Alyssum stylare* (Boiss. & Bal.) Boiss. Fl. Or. 1: 287. 1867 (!).

Meniocus stylaris Boiss. & Bal. in Boiss. Diagn. 3(6): 16. 1859 (!). Holotype, Turkey, B5: Prov. Kayseri, inter segetes ad basin montis Karamasdagh quinque leucis ad orientem urbis Caesareae siti, c. 1500 m., June & 2 July 1856, *Balansa* 486 (G); isotypes (A, K, OXF, W). TEXT-FIG. 1.

Annual, similar to, but larger and coarser than *Alyssum huetii*. *Leaves* (2-)8-20 \times 1.8-3 mm., \pm conduplicate, obtuse, increasing in size upward. *Inflorescence* lax, multibranched and somewhat circinate, (8-)10-20 cm. long. *Pedicels* spreading to ascending, 5-8 mm. long. *Sepals* \pm persistent, 3-3.5 mm. long. *Petals* deeply bilobed, spatulate and clawed, 4-6 \times 2-3 mm. *Long filaments* 3-4 mm. long, with unilateral teeth (0.5-0.7 mm. long) sometimes exceeding anthers. *Short filaments* 1.5-2.5 mm. long, with free (rarely connate) lanceolate appendages, as long or longer than filaments. *Fruits* elliptic to obovate, obtuse, (4-)5-7 \times (2.5-)3-4.5 mm., 4-8-ovulate, papillose with very dense, simple or furcate setae (0.5-1 mm. long). *Styles* slender 2-2.5 mm. long. *Seeds* wingless. *Fl.* May-July.

DISTRIBUTION AND HABITAT: a Turkish endemic of central and eastern Anatolia, the Upper Euphrates, the Cilician Taurus and the Anti-Taurus, in neglected fields, high steppe, and often associated with *Quercus-Poterium* scrub; alt. 1300-1850 m.

Turkey. A6: Prov. Sivas, Yaghsian-Tchoudak (nr. Kayulhisar), 1600 m., 1858, *Tchihatcheff* (G). A7: Prov. Gümüşane, Gümüşane, 21 May 1862, *Bourgeau* (G); Molirva-Mesere (nr. Sorda), 1894, *Sintenis* 5656 (BM, E, G, GH, K, W). A8: Prov. Gümüşane, dist. Bayburt, Gümüşane-Bayburt, 21 km. from Bayburt, 1620 m., *Huber-Morath* 14802 (HM); Bayburt, 11 July 1862, *Bourgeau* 171 (G). A/B6: Prov. Sivas Tokat, Sivas-Tokat, N. side of Artova pass,



TEXT-FIG. 2. Map showing distribution of *Alyssum blepharocarpum* (○) in Turkey.

Çamlibel dağ, 1850 m., 14 June 1939, *Reese* (HM). B6: Prov. Maraş, dist. Elbistan, Elbistan-Darende, 28 km. NE. of Elbistan, 1300 m., *Huber-Morath* 12821 (HM). B7: Prov. Erzincan, Sipikor dağ (nr. Keşiş dağ), Jerbatan, 1889, *Sintenis* 1543 (G, K) & 1890, *Sintenis* 3123 (K). C5: Prov. Niğde, Pursuk nr. Ulukisla), 1300 m., 1898, *Siehe* 89 (BM, G, K, W).

Among the species of section *MENIOCUS*, *Alyssum stylare* has the longest styles, and the densest fruit indumentum which is composed of tuberculate, simple (occasionally bi- or trifurcate) setae to 1 mm. long. The furcation of the hairs on the fruit is unique in the section.

Although *Alyssum stylare* is sympatric in the eastern part of its range with *A. blepharocarpum*, it always has larger and obtuse fruits, deeply bifid petals, and wingless seeds. Its larger flowers, denser fruit indumentum, larger and broader leaves, stricter habit, and much longer, circinate inflorescences distinguish it from *A. huetii*.

6. *Alyssum heterotrichum* Boiss. *Diagn.* 1(6): 15. 1845 (!). — Boiss. *Fl. Or.* 1: 287. 1867; in Buser, *Suppl. Fl. Or.*, 50, 1888. — Parsa, *Fl. Iran* 1: 248. *fig.* 620. 1952 — I. V. Pavlov (Ed.), *Fl. Kazakhstan* 4: 281. *tab.* 35, *fig.* 10. 1961. Holotype, Iran ad muros hortorum prope ruinas Persepolis, 11 Apr. 1842, *Kotschy* 224 (G); isotypes (BM, E, K, OXF, W).
- A. bungei* Boiss. *Fl. Or.* 1: 274. 1867 (!). Parsa, *Fl. Iran* 1: 727. 1952. Holotype, Iran, hab. in Persia, inter Isfahan et Teheran, May 1859, *Bunge* (G); isotype (K).
- A. betpakdalense* Rubtz. *Bull. Mosk. Obshch. Isp. Pri. Biol.* 52(2): 87. *fig.* 1. 1947. Holotype, Kasahstania, desertum Betpak-dala centralis in loco Koksaschik, 20 Apr. 1940, *Rubtzov* (AA, non vidi).

Annual, often low and decumbent, rarely more than 10 cm. tall. *Leaves* oblanceolate-spathulate, flat, 7–25 × 1–4 mm., decreasing in size upward. *Inflorescence* dense, 5 cm. or less long, frequently strongly branched with lateral branches ca. 1/2 as long as terminal. *Pedicels* ascending, 1.5–3 mm. long. *Sepals* ± persistent, obtuse, 1–1.5 mm. long, with very sparse indumentum. *Petals* obovate, emarginate, 0.7–1(–1.5) × 0.5–0.7 mm., greenish yellow. *Long filaments* 1–1.5 mm. long, with unilateral teeth (ca. 0.5 mm. long). *Short filaments* 0.7–1(–1.5) mm. long, with deeply bifid and basally connate appendages, 1/2 as long as filaments. *Fruits* narrowly elliptic-ovate or obovate, acute or attenuate (rarely otherwise), 3–4.5(–5) × 1.5–3 mm.; densely papillose and with simple, slender, and only slightly tuberculate setae (0.2–0.4 mm. long). *Styles* slender, 0.4–0.7 mm. long, glabrous. *Seeds* wingless. *Fl.* Jan.–Apr.

DISTRIBUTION AND HABITAT: dry rubble and mountain steppe in Iran, Afghanistan and Kazakhstan in Russia; alt. 1200–2000 m.

Iran. Prov. Khorasan, Djenaran-Kucan, *Rechinger* 7519, *p.p.* (W); Montes Kopet-Dagh, in jugo Alamli, ca. 2000 m., *Rechinger* 4760, *p.p.* (W); Montes Hazar Masdjid, Ardak-Tolgor, 1200–1600 m., *Rechinger* 5047 (W); Prov.

Hamadan, Aq Bulaq, 35° 36' N., 48° 27' E., ca. 100 km. N. of Hamadan, *Rioux & Golvan* 211 (w); Niriz, Fars, *Koelz* 14728 (w); Shiras, 1425 m., *Pravitz* 507 (s); nr. Schiraz, Dilguscha, Mar. 1868, *Hausknecht* (BM, G, K, W). **Afghanistan.** Prov. Pawan, 22 km. above Gulbahar in Panjshi valley, 1700 m., *Hedge & Wendelbo* 3005 (E).

The type specimens of *Alyssum bungei* do not deviate in any characters from material of *A. heterotrichum*, and accordingly the name, *A. bungei*, should be treated as a synonym of *A. heterotrichum*. Boissier considered *A. bungei* to be the only annual species of section ODONTARRHENA, but he commented that this was an artificial placement based entirely on his observation of its uniovulate fruit locules. I have examined fruits from the type material of *A. bungei* and have found that the fruit locules consistently contain four or five ovules. It is true, however, that only one of these ovules develops into a mature seed, while the others abort. In this case, the fruits are one-seeded and the aborted ovules are visible under magnification. *A. heterotrichum* is the only species in section MENIOCUS having setae on the fruits, and an entirely extra-Anatolian distribution.

7. ***Alyssum blepharocarpum*** Dudley & Huber-Morath, Jour. Arnold Arb. 45(1): 61. *pl. I, figs. 1-13.* 1964 (!). PL. I. TEXT-FIG. 2. Holotype, Turkey, B4: Prov. Ankara, dist. Kadinhan, Sarayönü-Cihanbeyli, Weizenfeld, 13 km. nordöstlich Sarayönü, 870 m., 1 June 1956, *Huber-Morath* 13722 (HM); isotype (E).

Annual, resembling *Alyssum huetii*, but of more delicate habit. *Leaves* linear, rarely subspathulate, (3.5-)8-20(-25) × 0.5-2 mm., usually decreasing in size upward. *Sepals* (1.5-)2.5-3 mm. long. *Petals* 2-4 mm. long, retuse. *Long filaments* (1.5-)2-3.5 mm. long, bilaterally winged, the wider wings having acute or denticulate teeth (0.5 mm. long), never exceeding the anthers. *Short filaments* 1.5-2 mm. long with connate, lanceolate or denticulate appendages, 1/2 or more the length of filaments. *Fruits* ovate-orbicular, usually truncate, 3.5-4.5(-5) × 2-3(-3.8) mm., papillose, or smooth, and always with sparse, short, slender tuberculate setae, at least on margins. *Styles* slender, (0.7-)1-2 mm. long. *Seeds* winged. *Fl.* Apr.-July.

DISTRIBUTION AND HABITAT: an endemic scattered in Inner Anatolia on disturbed lands, cultivated fields, saline steppe, and gypsum outcrops; alt. 500-1620 m.

The specimens known to date, and a discussion of this species may be found in Jour. Arnold Arb. 45(1): 61-63. 1964.

II. Section PSILONEMA (Meyer) Hooker

KEY TO ALL SPECIES OF SECTION PSILONEMA

- A. Fruits orbicular, rotund, oblate or ovate, emarginate or obtuse, with indumentum and smooth margins; sepals persistent; leaf margins entire.

- B. Fruit indumentum monomorphic, of stellate hairs only; petals glabrous or rarely with sparse adpressed indumentum; nectaries erect or subulate (up to 2 mm. long), or if \pm globose, then fruits obtuse.
- C. Fruit indumentum of non-overlapping, short-rayed stellate hairs; styles glabrous; petals retuse; nectaries subulate and erect; fruits emarginate. 8. *A. alyssoides*.
- C. Fruit indumentum of long-rayed and overlapping stellate hairs; styles with basal indumentum; petals deeply bifid; nectaries short, \pm globose; fruits obtuse. 9. *A. damascenum*.
- B. Fruit indumentum strigose and dimorphic, of adpressed stellate hairs, and erect, furcate \pm tuberculate hairs; petals with dense strigose indumentum; nectaries always reduced and globose, less than 0.4 mm. long.
- D. Seeds winged; styles 0.5–1 mm. long, not basally dilated, glabrous, or with sparse basal indumentum of adpressed stellate hairs; leaves linear-oblongate, or elliptic-oblong, increasing in size upwards. 10. *A. granatense*.
- D. Seeds wingless; styles (1–)1.5–2 mm. long, strongly dilated at the base with dense dimorphic indumentum; leaves obovate-spathulate, decreasing in size upwards. 11. *A. dasycarpum*.
- A. Fruits broadly obovate, truncate, glabrous, with papillose margins; sepals deciduous; leaves minutely denticulate at apices. 12. *A. homalocarpum*.

8. *Alyssum alyssoides* (L.)L. Amoen. Acad. 4: 487. 1759 (!); Syst. Nat. ed. 10. 2: 1130. 1759. — Hal. Consp. Fl. Graec. 1: 99. 1909. — Schinz & Thell. Bull. Herb. Boiss. II. 7: 407. 1907. — Beck, Fl. Bosne, Herceg. 2(7): 302. 1916. — Rydberg, Fl. Rocky Mt. & Adj. Plains, 347. 1923. — Hayek, Prodr. Fl. Penin. Balc. 1: 439. 1925. — Nyár. Magyar Bot. Lap. 24: tab. 1, fig. 24. 1925; Bull. Bot. Grad. Cluj 7: tab. 8, fig. 106. 1927. — Jávorka & Csapody, Ic. Fl. Hung. 7: 211. fig. 1590. 1930. — Degen, Fl. Veleb. 2: 187. 1937. — Mansfeld, Repert. Sp. Nov. 46: 114. 1939. — Rech. Fl. Aegaea 225. 1943. — Abrams, Ill. Fl. Pacific States 2: 319. fig. 2149. 1944. — Hylander, Uppsala Univ. Årsskr. 7: 182. 1945. — Fernald, Gray's Manual of Botany, ed. 8. 699. fig. 1805. 1950. — Gleason, New Britton & Brown Ill. Fl. Ne. U. S. & Adj. Canada 2: 220. 1952. — Lid, Norsk. Fl. 325. 1952. — Parsa, Fl. Iran 1: 744. fig. 617. 1952. — Pawł. Fl. Tatrorum 325. 1956. — Lagerberg, Vilda Växter Nord. 2: 762. fig. 394b. 1957. — Markgraf in Hegi, Ill. Fl. Mitt.-Europa, ed. 2. 4(1): 288. tab. 125, figs. 23, 44; tab. 127, figs. 3a, b; fig. 170a. 1960. — Heywood, Repert. Sp. Nov. 64(1): 53. 1961. — Dudley, Jour. Arnold Arb. 45(1): 63–65. 1964; in Rech. Fl. Lowland Iraq 306. 1964. — Ball & Dudley in Flora Europaea 1: 299. 1964.

Annual or biennial, with few or many, erect, decumbent or ascending, rarely prostrate stems, up to 50 cm. long. *Indumentum* grayish-green (rarely silvery) of adpressed stellate hairs having few and \pm short rays (density variable). *Leaves* obovate or linear-oblongate, up to 4 cm. long. *Racemes* elongated, rarely reduced, up to 15 cm. long, and if

branched, branches never exceeding the terminal axis. *Pedicels* 2–6 mm. long, spreading or horizontal. *Sepals* (1.5–)2–3 mm. long, persistent. *Petals* obovate, usually glabrous, emarginate, 2–3(–4) mm. long, often scarcely exceeding the sepals and persistent with them. *Filaments* 1–1.5 mm. long, always edentate and unappendaged. *Nectaries* slender and erect, 0.5–0.8 mm. long. *Fruits* orbicular, emarginate or truncate, (2–)3–4(–5) mm. long and wide; valves equally inflated at centers, and with flattened margins, covered with an indumentum of minute (0.2–0.3 mm. in diameter) adpressed stellate hairs (density variable). *Styles* 0.3–0.6(–1) mm. long, \pm slender, usually glabrous. *Seeds* narrowly winged. $2n = 32$. *Fl.* Mar.–Aug. Two varieties are recognized:

- A. Leaves oblanceolate or linear, (3–)10–40 \times 1.5–3 mm., with sparse grayish-green indumentum; plants always more than 5 cm. tall, usually 15–35 cm.; racemes elongated, never umbellate, (2–)5–15 cm. long, 10-fruited, or more. a. *Var. alyssoides*.
- A. Leaves obovate, 2–3.5 \times 0.5–1 mm., with dense silvery indumentum; plants very reduced, 1–3 cm. tall; racemes very reduced and umbellate, 0.5–1 cm. long, 3–7-fruited. b. *Var. depressum*.

a. *Var. alyssoides*.

Clypeola alyssoides L. Sp. Pl. 2: 652. 1753 (!). Type, Europe in Austria et Gallia; “2. *Clypeola* siliculis bilocularibus tetraspermis” (BM, hort. Clifford; *Clypeola* No. 2, sub “*Alysson incanum luteum serpilli folia*.”).

Clypeola campestris L. op. cit. 652, 1231. Type protologue refers to Sauvages, *Methodus Foliorum Monspeliensis*. . . . 71. 1751, reading: “No. 405 *Clyp.* annua siliculis bilocularibus dispermis calyce persistente. . . .”, and to C. Bauhin, *Pinax*, 107. 1623, reading: “*Alysson dictum campestre minus*.”

Alyssum calycinum L. Sp. Pl. ed. 2. 2: 908. 1763 (!). — Jacquin, Fl. Austr. 4: tab. 338. 1776. — Reich. Ic. Fl. Germ. & Helv. 2: tab. 18, fig. 4269. 1837–1838. — Bertoloni, Fl. Ital. 6: 483. 1844. — Boiss. Fl. Or. 1: 285. 1867. — Cusin & Ansb. Herb. Fl. Fr. 2: tab. 312. 1869. — Ruprecht, Fl. Caucasi. 105. 1869. — Etings. & Pokorny, Physio. Pl. Aust. 9: tab. 871. 1873. — Mora, Fl. Fan. Esp. & Port. 6: 560. 1873. — Willk. & Lange, Prodr. Fl. Hisp. 3: 833. 1880. — Brandza, Fl. Rom. 136. 1833. — Schlecht., Lang. & Schenk, Fl. Deutschl. ed. 5. 14: 195. tab. 1387. 1883. — Colmeiro, Pl. Penin. Hispano-Lusit. 155. 1885. — Simonkai, Enum. Fl. Transsil. 91. 1886. — Beck, Fl. Nieder-Österr. 469. 1892. — Rouy & Fouc. Fl. Fr. 2: 185. 1895. (incl. vars.). — Robinson in Gray, Synopt. Fl. N. Am. 1(1): 115. 1895. — Grecescu, Consp. Fl. Român. 68. 1898 (excl. var. [β] *depressum*). — Pauletti in Fiori & Pauletti, Fl. Anal. Ital. 1: 457. fig. 1447. 1898–1899. — Busch in Kuznetsov, Busch & Fomin, Fl. Cauc. Crit. 3(4): 601. 1909 (incl. forma); in Fl. U. R. S. S. 8: 358. 1939. — Bornm. Bot. Centralb. Beih. 38: 479. 1921. — Szafera, Fl. Polska 3: 177. 1927. — Boul. Fl. Liban & Syr. 32. 1930. — Thiébaud, Fl. Lib.-Syr. 1: 71. 1936. — Palhinha, Fl. Port. ed. 2. 307. 1939. — Grossheim, Fl. Kavk. ed. 2. 4: 220. tab. 25, fig. 6. 1950. — Jessen, Vilde Pl. Nord. 2: 598. fig. 410, fig. 411b. 1950. — Karjagin, Fl. Azerbaid. 4: 277. 1953. Type, Europe, Austria, Gallia, Germania (BM, hort. Clifford; *Clypeola* No. 2).

Alyssum campestre L. op. cit. 909., pro parte (!).

- Adyseton calycinum* (L.). Scop. Fl. Carn. ed. 2. 2: 13. 1772 (!). — Bubani, Fl. Pyrenaea 3: 209. 1901.
- Psilonema calycinum* (L.) Meyer, Bull. Acad. Sci. St. Pétersb. 7: 132. 1840 (!); Mém. Acad. Sci. St. Pétersb. VI. 6: 15. tab. 2, upper right. 1840; in Ledebour, Fl. Ross. 1: 137. 1842. — Schur, Enum. Pl. Transsil. 630. 1866 (excl. var. *depressum*). — Fedtschenko, Fl. Ross. Austro-Orient. 5: 440. pl. 388, fig. A. 1931. — Popov, Fl. Ukraine 5: 344. 1953.
- Alyssum ruderales* Jordan, Diagn. Nouv. 198. 1864. Type, Switzerland, hab. in ruderalis et agris incultis circa Genève, *Jordan* (p, non vidi).
- A. vagum* Jordan, *ibid.* Type, France, hab. in ruderalis et sabulosis agris lugdunensis, Villeurbanne (Rhône), *Jordan* (p, non vidi).
- A. sabulosum* Jordan, *op. cit.* 199. Type, France, hab. in sabulosis Beugesis, Thoirette (Ain), *Navier* (p, non vidi).
- A. arvaticum* Jordan, *op. cit.* 200. Type, France, hab. in ruderalis et arvis, Delphinatûs superioris; La Grave (Hautes-Alps), *Jordan* (p, non vidi).
- A. erraticum* Jordan, *loc. cit.* Type, France, hab. in ruderalis et arvis pyrenaeorum Gèdre (Hautes-Pyrénées), *Jordan* (p, non vidi).
- A. sublineare* Jordan, *op. cit.* 201. Type, France, hab. in ruderalis et sabulosis montium Occitanieae, Mas-Cabardès (Aude), *Jordan* (p, non vidi).

DISTRIBUTION AND HABITAT: a widespread weed species of western, central and southern Europe, Russia, North Africa and Afghanistan in ruderal and disturbed habitats and mountain meadows; sea level–2000 (–2800) m. Probably introduced and naturalized in northern Europe, including the British Isles and Scandinavia. Naturalized in the United States and Canada, and in the Argentine of South America. Recorded from Turkey.

England. Dirleton Common, 24 June 1835, *Macnab* (E); Surrey, Wandsworth, July 1835, *Hunter* (E). France. Montpellier, Herault, 27 Apr. 1894, *Galavielle* (E, G, W); *ibid.*, *Arnott* (E, K); Paris, *Forbes s.n.* (E); Zabern, May 1896, *Krebs* (BM, E, G, K, W); Loches, Apr. 1841, *Trevelyan* (E, K); Paris, Bois de Boulogne, *Cosson* (G, GH); La Maures, Hyères, 30 Apr. 1906, *Raine* (GH). Corsica. Mt. Pietro, *Solenol* 355 (BM). Spain. Pyrenees, 2 May 1896, *Guillot* (BM); Centellas, Pyrenees, nr. French border, *Lesins* 24 (A); Sierra del Cuarto, 1800 m., *Reverchon* 1276 (BM, E, G); Barcelona, *Gonzala* 5453 (BM); *ibid.*, 450 m., *Gonzala* 5434 (BM); *ibid.*, 3 May 1918, *Sennen* (BM, E); *ibid.*, Cantalejo, *Sennen* 2964 (BM); Cerdagne, 1380 m., 12 June 1926, *Sennen* (BM); *ibid.*, Angoustrone Grande Rigole, *Sennen* 6040 (BM); Sierra de Barza, 1890, *Ball* (BM, E, GH, K); Distr. Logrono Sorio, Viniegra-Montenegro, Sierra de la Urbion, 1700 m., *Dresser* 610 (E). Sweden. Skåne i Alnarp, June 1841, *Palmer* (E); Uppsala, *Anderssen s.n.* (E); *ibid.*, July 1866, *Ahlberg* (GH, K); Askersund, 11 June 1887, *Wyring* (BM, GH, K); Prov. Gotland, Paroecia Alskog, *Asplund* 877 (BM, GH, W); Stenkyrka, 19 June 1867, *Oldberg* (GH). Denmark. Isle of Møen, June 1926, *Jöker* (GH, W); *ibid.*, May 1846, *Tütein* (GH); *ibid.*, *Schonid* (GH). Germany. Jura, nr. Regensburg, 410 m., *Rubner* 781a (BM, E, K, W); Munich, May–June 1829, *Rosh* (E, W); Thusran, *Grierson* 30 (E); Baden nr. Wiesloch, 200 m., *Zimmerman* 8 (BM, E, K, W); Berlin, 14 May 1896, *Rehder* (GH); Kies, 800 m., *Zick* 781a, b (BM, G, GH, K, W); Thuringia, nr. Arustadt, 19 Apr. 1902, *Reineck* (GH, W). Switzerland. Zurich, 26 June 1880, *Rehder* (GH); May 1836, *Naegeli* (E, W); Thun, Apr. 1838, *Brown* (E, K); Vallaris Rhône, May 1858, *Balfour* (E); Aug. 1889, *Dickson* (E); Aigle, 4–9 June 1885,

Hamilton (E); Jura, nr. Neuville, 9 Aug. 1834, *Shuttleworth* (E); Zermatt-Zmutt, May 1961, *Dudley* (A); Chur, 700 m., *Meisser 340* (BM, G, GH, K, W); *Seringe 2891* (BM, GH, K). **Italy.** Sulmona, Campio de Jaeve, *Lesins 11* (A); Naples, 1845, *Alexander* (E); nr. Bormio, 18 Aug. 1870, *Ball* (BM, E, K); Florence, *Babington* (E); St. Cauzian, *Crawford 26* (E); Calabria, Sila nr. San Giovanni in Fiore, 1000 m., 1933, *Bornmüller 80* (A). Sicily, Mt. Nebrodense, *Todaro s.n.* (G, GH, W); 1700–1934 m., 21 July 1874, *Stroblysi* (BM). **Poland.** Kielce, 18 May–30 May 1897, *Bodzentyń* (E, W); Kiovis nr. Karawajewi, *Lazarenko 65* (BM, E, K, W); Prov. Kioviensis, distr. Smila, pr. Jablunilvka, *Kleopow s.n.* (BM, E, K, W). **Czechoslovakia.** Kaaden, nr. Tätsch, 700 m., *Stelzhamer 346* (BM, E, G, GH, K, W). **Austria.** St. Veit, 6 June 1898, *Krebs* (E, G, K, W); nr. Graz, 360 m., *Kritsch 749* (BM, E, G, K, W); nr. Judenburg, 710 m., *Pilhatsch 748* (BM, E, G, K, W); Mariazell, *Fleischmann s.n.* (BM, E, G, GH, K, W); Laibach, *Fleischmann s.n.* (BM, E, G, GH, K, W). **Hungary.** Mt. Rokahety nr. Bekras, 4 June 1922, *Degen* (W); Sörkut-Torik-Báirit, 24 June 1922, *Degen* (W); Chemnitz, 1890, *Ball* (BM, E, GH, K). **Romania.** Transsilvania, distr. Brasov, nr. Härman, 500 m., *Borza 651c* (BM, E, G, K, W); distr., Turda Aries, Cheia Turzii, nr. Turda, 450 m., *Borza 651a* (BM, E, G, K, W); distr. Constanta, Dobrogea, nr. Murfatlar, 100 m., *Borza 651b* (BM, E, G, K, W). **Yugoslavia.** Macedonia, Crni Drin, Struga-Debar, *Rechinger 15975* (W); Serbia orientalis, Bela Palanka-Pirot, 600–800 m., *Rechinger 15865* (W); *ibid.* Nischka Banja, nr. Nisch, *Rechinger 16072* (W); *ibid.*, Nischa Banja-Bela Palank, 600–800 m., *Rechinger 15839* (W); Serbia, Vanjano, May 1898, *Adamovic* (E, W); Sarlark nr. Pirot, 15 May 1897, *Adamovic* (E, K, W). **Albania.** Bertiscus, nr. Pec (Ipek), 500–700 m., *Rechinger & Scheffer 104* (W); Katimi nr. Bukovik, distr. Hati, *Baldacci 298* (BM); Kolasia, *Baldacci 9* (BM); Kia nr. Skutari, *Dörfler 153* (W). **Greece.** Terkovic-Sliovo, *Rechinger 8* (W); Epirus, Tonschiefer, nr. Arachthos river, *Rechinger 23199* (W); Macedonia orientalis, distr. Drama, Boz dagh, nr. Juricik, 300 m., *Rechinger 6351b* (W); *ibid.*, Lekhani-Kechrokampos, valley of river Mesta (Nestos), 700–900 m., *Rechinger 15632* (W); Thrace, Orestias-Visi, *Rechinger 22031* (W); *ibid.*, Mt. Rhodope, nr. Jasmos (Jasi-Koi), *Rechinger 9579* (W); Mt. Olympus nr. Hagios, Diontsios, 800 m., 21 Mar. 1940, *Charworth-Masters 9579* (BM); Xanthi, *Lesins 6* (A); Mt. Malevo, Laconiae, *Orphanides 2638* (G, W); Parhes, Hagios-Trios, 400 m., *Samuelsson 141* (W). **Crete.** Lassithi, Mt. Lazaro, *Gandoger 77* (BM). **Russia.** Crimea, Yalta, above Nikita, 350 m., *Davis 33328* (BM, E, K); Crimea, 1820, *Steven* (G-DC); Kiev, *Zinger 555* (E, W); Königsburg (East Prussia), *Baenitz s.n.* (BM, E, G, GH, K, W); Caucasus, Prov. Terek, Ossetia Balta, *Brotherus 86* (BM); *ibid.*, 17 July 1911, *Busch* (BM, E, G, GH, K, W); Prov. Chewsuria, 1 Aug. 1903, *Busch* (BM, E, G, GH, K, W); Daghestan, 1874, *Becker* (BM, K); Azerbaidjan, Ismaily, Ovanovka-Ismaily, 24 May 1936, *Grossheim* (BM). **Bulgaria.** Varna, 1846, *Noë* (K); Haskovo-Harmanli, *Rechinger 21770a* (W); nr. Sreden-tschitlik, close to Russian border (Rustschuk), *Rechinger 638* (W); Black Sea, Aladscha, Sveti Konstantin, nr. Varna, *Rechinger 1057* (W); Čerpan, June 1900, *Stribňny p.p.* (E, K, W). **Turkey** (records only). A2(A): Prov. Bursa, Bithynia Olympos (Ulu dağ), *Sestini* (fide Fenzl in Tchihatcheff, *Asie Min. Bot.* 1(3): 313. 1860). A7: Prov. Trabzon, Boztepe, 21 June 1917, *Schischkin* (fide Schischk. Ber. Staats-Univ. Tomsk 80: 465. 1929); Prov. Trabzon Gümüşane, nr. Vischera, Kalanema Dere, 500 m., June 1908, *Blumencron* (fide Handel-Mazzetti, *Ann. Naturh. Mus. Wien* 23: 156. 1909). B6: Prov. Maraş, Elbistan, *Asdurian 85* (fide Béguinot & Diartz. *Contrib. Fl. Arm.* 47. 1912). B10: Prov. Doğanbayazit, Dutach-Bur-

nubulak, 26 May 1916, *Schischkin* (fide Schischk. loc. cit.). C6: Prov. Gaziantep, Killis, *Post 335* (fide Post, Bull. Herb. Boiss, II. 3: 163. 1895). Tokat-Erzurum, *Aucher s.n.* (fide Fenzl, loc. cit.). Afghanistan. Prov. Kabul, Kabul-Paghman, 2800 m., *Hedge & Wendelbo 3146* (BG, E).

Canada. Quebec. Wolfe County, nr. Lake Aylmer, *Wells 37470* (GH); Missisquoi County, Philipsburg, 10-11 Aug. 1923, *Knowlton* (GH); *ibid.*, *Marie-Victorin & Rolland-Germain 34152, 43296* (GH). Ontario. Waterloo County, German Mills, Cressman's woods, *Montgomery 198* (GH); Learnington, *Macoun 33775* (GH).

United States. Maine. Orono, 16 June 1890, *Fernald* (NEBC); Bar Harbor, 11 June 1899, *Rand* (NEBC). Vermont. Chittenden County, Colchester, S. of Porter's Swamp, *Charette & Smith 2430* (NEBC); *ibid.*, *Charette 2439* (NEBC). Massachusetts. Suffolk County, Franklin Park, Boston, 11 June 1891, *Manning* (GH, NEBC); Jamaica Plain, June 1875, *Faxon* (GH); Medford-Malden, May 1880, *Davenport* (GH); *ibid.*, 6 May 1882, *Manning* (NEBC); Belmont, 6 June 1898, *Hoffmann* (NEBC); Medford, 24 June 1880, *Davenport* (NEBC); Somerville, 10 May 1878, *Perkins* (NEBC); Norfolk County, Milton, 6 June 1897, *Kennedy* (GH); *ibid.*, 17 July 1915, *Kidder* (NEBC); Barnstable County, Bourne, nr. Monument Beach, 20 June 1911, *Knowlton* (GH, NEBC); Falmouth, July 1882, *Farlow* (NEBC); Bristol County, Dartmouth, *Sturtevant s.n.* (NEBC); *ibid.*, 13 June 1904, *Hervey* (NEBC); Amherst, 1859, *Gray* (GH). Rhode Island. Providence, 12 June 1890, *Collins* (NEBC). Connecticut. New Haven County, Lighthouse Point, East Haven, *Eames 216* (GH); *ibid.*, 17 June 1902, *Harger* (NEBC); Middlebury, *Harger 4290* (NEBC); Hartford County, Southington, 31 May 1897, *Bissell* (NEBC). New York. Washington County, Vaughn, N. of Hudson Falls, 10 June 1915, *Burnham* (GH); Tuckahoe, 12 May 1894, *Pollard* (GH); Mt. Beacon, Hudson River, opposite Newburgh, June 1906, *Kochler* (GH); nr. Plattsburgh, *Hunnewell 4667* (GH); Onondaga County, East Green Lake, Jamesville, *Wiegand 15516* (GH); Columbia County, Becraft Mt., Greenfort, *McVaugh 317* (GH). Pennsylvania. Mt. Airy reservoir, 12 May 1871, *Parker* (GH); Berks County, Bernville, *Stoudt & Hermann 2768* (GH); College Hill, Easton, June 1875, *Porter* (GH); *ibid.*, 8 June 1892, *Porter* (GH). West Virginia. Greenbrier County, White Sulphur Springs, *Hunnewell 2593* (GH); Berkeley County, nr. Inwood, *Hunnewell 19182* (GH). Virginia. Clarke County, nr. Boyce, *Allard 106* (GH); *ibid.*, *Hunnewell 14991* (GH); Shenandoah County, Pugh's Run, *Artz 830* (GH); *ibid.*, Strasburg, *Baldwin 5064* (GH); nr. Cedarville, *Pease 26574* (GH). Michigan. Near Lansing, 8 June 1887, *L. H. Bailey* (GH); Berrian Springs, *Pease 17777* (GH). Indiana. Tolleston, *Umbach 1787* (GH); Fulton County, 1 mile Ne. of Leiter's Ford, *Deam 56019* (GH). Wisconsin. County highway "D," S. of Madison, 18 June 1945, *Greene* (GH). Illinois. Ravenswood, nr. Chicago, 7 June 1883, *Arthur* (GH); McHenry County, Algonquin, *Benke 5741* (GH); Kankakee County, E. of St. Anne, *Jones 11430* (GH). Montana. Many Glaciers, Glacier Park, *Pease 22323* (GH); Riverside Park, 975 m., *Kirkwood 1129* (GH). Idaho. College campus, Moscow, *Henderson 2759* (GH); ca. 2 miles S. of Grangeville on Whitebird Road, *Jones 73* (GH); 3 miles E. of Joseph on Joseph-Whitebird Road, *Jones 163* (GH); Teton County, Victor, 1829 m., *Payson & Payson 2160* (GH). Wyoming. Sheridan County, Red Grade, E. slope of Big Horn Mt., 1981 m. *Rollins 57177* (GH). Utah. Newton-Heyde Park, *Jones 288* (GH); Salt Lake City, *Rollins 3095* (GH); Cache County, Sage E. of U. S. A. C. stadium, Logan, 1433 m., *Maguire 34581* (GH). California. Oakland, *Brewer 2577* (GH); Siskiyou County, Yreka, *Smith*

90, 655 (GH); *ibid.*, Sisson, *Heller 8054* (GH); *ibid.*, Parker ranch, Plowman's valley, 12 June 1948, *Parker* (GH). Oregon. Selkirk, nr. Nelson, *Shaw 663* (GH); Des Chutes river, 5 miles below bend, *Peck 1713* (GH).

Argentina. Partido de Saavedra, Sierra de la Ermita, *Cabrera 5459* (GH).

The nomenclatural confusion between *Alyssum alyssoides* and *A. minus* (*A. campestre* sensu multo auct.) has been discussed in an earlier paper (Jour. Arnold Arb. 45: 63–65. 1964). Although these two species are assigned to different sections, to section PSILONEMA and section ALYSSUM respectively, they are frequently confused. The sepals of *A. alyssoides* are always persistent, its filaments are very slender, edentate and unappendaged, its nectaries are peg-like and erect, and its styles are usually glabrous. In addition, the symmetrically inflated fruits of *A. alyssoides* are generally smaller, and the easily displaced indumentum on the fruits is composed of shorter-rayed stellate hairs.

Although specimens of *A. alyssoides* have been recorded from Turkey, I have not seen any Turkish material. Certainly its presence in Anatolia needs confirmation. It seems safe, however, to assume that the records from the Armenian Highlands in eastern Turkey are correct. It is well known from the Caucasus, and its presence in Armenia would be an expected pattern of distribution. Throughout the Levant, *A. alyssoides* is very rare (cf. Bornmüller, Bot. Centralbl. Beih. 38: 479. 1921). For the most part, the Caucasian, Turkish and Afghanistan specimens of *A. alyssoides* are from higher altitudes (e.g. *Hedge & Wendelbo 3146*, Afghanistan at 2800 m.) than are those normally found in Europe. From the paucity of records and specimens from the Levant it is assumed that this species has been unable to colonize and spread in the ruderal and disturbed types of environments, with which it is normally associated throughout much of Europe. Rather, it is apparently confined to isolated pockets in the mountains. Conversely, it is interesting to note that it has adapted well to the ruderal habitats of North America, and accordingly seems to be commoner than in Turkey.

As a common European species *A. alyssoides* has long been subjected to a very critical examination by numerous workers, many of whom (i.e. Jordan, Sennen, Nyárády, Prodan, etc.) have contributed to the literature approximately thirty taxonomic segregates, mostly of varietal or formal rank, and almost twice as many recombinations. As it would not be in the interests of brevity or clarity to cite all of those minor synonyms, I have referred only to those species of Jordan which subsequently have been recombined many times as subspecies, varieties, formae, and even subformae. This species is very polymorphic with respect to plant height, stem length, leaf size, leaf, fruit and sepal indumentum density, and raceme length. The many segregates, excluding var. *depressum* which follows, have been based chiefly on single character deviations, which are very flexible and unstable according to the varying environmental pressures. Many of the characters rarely occur on a population basis, and examination of the type specimens has revealed that, more often than not,

the characters are not constant on individual plants. When the morphological variation of *A. alyssoides* is considered throughout the whole range of distribution, characters such as density of fruit indumentum do not appear to have the stability essential for taxonomic recognition. The one exception is var. *depressum* which forms small and scattered, but phenotypically stable populations in Romania, Hungary, Bulgaria, Greece, and Crete.

b. Var. *depressum* (Schur) Dudley, comb. nov.

Psilonema calycinum var. [c.] *depressum* Schur, Enum. Pl. Transsil. 62. 1866 (!). Holotype, Romania, Hermannstadt, Schur s.n. (w).

Alyssum calycinum var. *pumilum* Hal. Denkschr. Akad. Wien Math. Naturw. 61: 496. 1894 (!). Holotype, Greece, Arcadia, in lapidosis calcareis regionis abietinae Mt. Chelmos (Aroania vet.) gregarie., 1500 m. (in der Tannenregion des Chelmos oberhalb Sudena, 1200–1500 m.), 15 Apr. 1893, Halacsy (w).

A. calycinum var. [β] *depressum* (Schur) Grecescu, Consp. Fl. Rom. 69. 1898 (!).

A. calycinum var. *minus* Velen. Sitz-ber. Böhm. Ges. Wissen. Prag 27: 3. 1902 (!). Holotype, Bulgaria, in Mt. Tikiski, Balkan, *Urumov* (PRC, non vidi); isotype (w).

A. conglobulatum Fil. & Jáv. Magyar Bot. Lap. 9: 146. 1910 (!); Rep. Nat. Mus. Hung. 107. tab. 1, fig. 2. 1910. Holotype, Hungary, in virgultis cacuminis montis Nagy-Szénáshegy ad pag. Pilissentwány, Comit. Pest, ca. 500 m., 9 June 1909, *Filarszky & Kümmerle* (BP, non vidi); isotypes (BM, E, G, K, W).

A. alyssoides var. *conglobulatum* (Fil. & Jáv.) Jáv. Fl. Hung. 441. 1924 (!); Jáv. & Csapody, Ic. Fl. Hung. 7: 211. fig. 1590a. 1930.

A. alyssoides var. *pumilum* (Hal.) Hayek, Prodr. Fl. Penin. Balcan. 1: 439. 1925 (!). — Vierh. & Rech. Öst. Bot. Zeit. 84: 139. 1935. — Rech. Fl. Aegaea 225. 1943.

A. alyssoides f. *minus* (Velen.) Hayek, loc. cit. (!).

A. calycinum f. *minus* (Velen.) Stoj. & Steff. Fl. Bulg. ed. 2527. 1948 (!).

DISTRIBUTION AND HABITAT: rare on calcareous substrates of mountains in Hungary, Romania, Greece and Crete.

Hungary. Comit. Pest, Mt. Szénáshegy nr. Pilisszentiván, (locus classicus), 400–500 m., *Filarszky & Jávorka* 46 (BM, E, G, GH, K, W). Crete. Pezzuta, *Todaro* s.n. (w); Mt. Psiloriti, nr. Nidha, *Dörfler* 774a (w).

9. *Alyssum damascenum* Boiss. & Gaill. in Boiss. Diagn. 3(6): 18. 1859 (!). — Boiss. Fl. Or. 1: 285. 1867. — Bornm. Verh. Zool.-Bot. Ges. Wien 48: 553. 1898. — Boul. Fl. Lib. & Syr. 32. pl. 38, fig. 2. 1930. — Post & Dinsmore, Fl. Syria, Pal. & Sinai, ed. 2. 1:88. 1932. — Thiébaud, Fl. Lib.-Syr. 1: 71. 1936. — Zohary, Pal. Jour. Bot. Jer. ser. 2(2/3): 129 & 161. 1941. Holotype, Syria, in cultis inter Merre et Damascus (Jardin e Ganchedulu), 18 Mar. 1847, *Gaillardot* 817 (G); isotype (A).

Annual, low growing, resembling *Alyssum contemptum* in habit; sparingly branched from the base, 5–10 cm. in height. *Leaves* oblanceolate-spathulate, acute, decreasing in size upward, uppermost involucrate; indumentum on the lower surfaces denser, and of smaller stellate hairs than that on upper surfaces. *Racemes* simple, or sparsely branched from the base, 1–4 cm. long. *Pedicels* erect or ascending, \pm basally dilated, 3–5 mm. long. *Sepals* persistent, ca. 2 mm. long, with narrow scarious wings; indumentum sparse, but with apical tufts of furcate, erect hairs. *Petals* narrowly spathulate, $2.5\text{--}3 \times 0.5\text{--}0.8$ mm., deeply bifid. *Filaments* 2–3 mm. long, edentate and wingless. *Fruits* ovate or rotund, $3.5\text{--}4.5(-5) \times 3\text{--}4.5$ mm., obtuse; valves \pm equally inflated, and with \pm dense indumentum of relatively coarse stellate hairs. *Styles* 0.6–1 mm., with basal indumentum. *Seeds* narrowly winged. *Fl.* Mar.–Apr.

DISTRIBUTION AND HABITAT: a Saharo-Sindian species of dry hillsides and cultivated or fallow fields in Syria and Palestine; alt. 200–1000(–1900) m.

Syria. Aleppo-Aintab (Gaziantep), 610 m., 6 May 1865, *Hausknecht* (BM, c); Mt. Carmel, Apr. 1928, *Druce* (OXF); Damascus, Salatje, *Péronin* 583 p.p. (G); *ibid.*, Kessoué, *Péronin* 1879 (G); *ibid.*, *Davis* 5633 (E, K); *ibid.* Mt. Gebel Khaisoun, *Gaillardot* 856 (G). **Palestine.** Jericho, Ain-i-Sultan-Wadi Kilt, 200 m., 1897, *Bornmüller* 71 (G, W). **Lebanon.** Dschebel Sannin, 1700–1900 m., 10 June 1904, *Kneucker* (GH).

Alyssum damascenum is sometimes confused with *A. minus*, a weedy species in section ALYSSUM common throughout most of Europe and the Near East, because of a resemblance in fruit shape and indumentum. The filaments of *A. damascenum*, however, are always wingless, edentate, and unappendaged, while those of *A. minus* are widely winged, appendaged, and usually dentate. *A. contemptum* from Palestine, another species of section ALYSSUM is sometimes confused with *A. damascenum* due to the annual, low growing habit. *A. contemptum* has widely winged toothed and appendaged filaments, small globose nectaries, entire or merely emarginate petals, and elliptic fruits whose valves are very asymmetrically inflated, similar to those of *A. szowitsianum*. The fruits of *A. damascenum* are orbicular with more or less equally inflated valves, its nectaries are erect and peg-like, and its petals are deeply bifid.

Zohary and Fahn (*Pal. Jour. Bot. Jer. ser.* 2(2/3): 130. 1941) and Zohary (*op. cit.* 161) assign *A. damascenum* to the group of annual species in section ALYSSUM (including *A. marginatum* and *A. szowitsianum*) characterized by a unique pedicel anatomy associated with the specialized hygrochastic method of seed dispersal. However, in addition to possessing the diagnostic features of section PSILONEMA, *A. damascenum* has a pedicel anatomy, which (as originally noticed by Zohary & Fahn) is different from that of the other species mentioned. These facts suggest that, although the annual species of section PSILONEMA and section

ALYSSUM are closely allied, the phenomenon of hygrochastic dispersal has developed convergently within the two sections.

10. *Alyssum granatense* Boiss. & Reut. Pug. Pl. Nov. Afr. Bor. & Hisp. Aust. 9. 1852 (!). — Mora, Fl. Fan. Esp. & Portug. 6: 561. 1873. — Willk. & Lange, Prodr. Fl. Hisp. 3: 833. 1880. — Cosson, Ill. Fl. Atl. 1: 61. *tab.* 42. 1884; Comp. Fl. Atl. 2: 236. 1887. — Batt. in Batt. & Trab., Fl. Algérie 1: 47. 1888. — Cadevall & Sallent, Fl. Catal. 1: 142. 1915. — Palhinda, Fl. Portug. ed. 2. 307. 1939. — Heywood, Repert. Sp. Nov. 64(1): 53. 1961. — Quezel & Santa, Nouv. Fl. Algér. 1: 410. 1962. — Ball & Dudley in Flora Europaea 1: 299. 1964. Syntypes, Spain, in arenosis et cultis regionis alpinae montium Granatensium, Sierra de la Nieve supra Yunquera, *Boissier & Reuter* (BM, G, W); in Sierra Nevada circa Benalcaza, *Boissier* (BM, G, W). Lectotype, Sierra de la Nieve supra Yunquera, *Boissier & Reuter* (G); isolectotypes (BM, W).
- A. willkommii* de Roem. ex Willk. Linnaea 25: 8. 1852 (!). Holotype, Spain, in collibus arenosis siccis prope oppidum Ayamonte, Jan. 1846, *de Roemer* (LZ, destroyed); isotype (BM).
- A. granatense* var. *sepalinum* Pomel, Nouv. Mat. Fl. Atl. 231. 1874 (!). Holotype, North Africa, a Garrouban, Téniet-el-Haâd, Tala-Yezid, *Pomel* (AL, non vidi); isotype (W).
- A. algeriense* Pomel, op. cit., 232 (!). Holotype, North Africa, de Garrouban à Téniet-el-Haâd, *Pomel* (AL, non vidi); isotype (W).
- A. algeriense* var. *montanum* Pomel, loc. cit. (!). Holotype, North Africa, Djebel Endatte, près de Téniet-el-Haâd, *Pomel* (AL, non vidi); isotype (W).
- A. hispidum* Loscos & Pardo ex Willk. Ill. Fl. Hisp. & Balear. 1: 85. 1882 (!); Suppl. Prodr. Fl. Hisp. 304. 1893. — Syntypes, Spain, en Castelserás particul. en el Cerillo de Calvario, en la huerta de Torrecilla, Castellote, Calaceite y nesar. pasá á Cataluña par Caseras, *Loscos* (W); cerca de Aranda, *Calavia* (W). Lectotype, Aragon, Castelserás, 25 Jan. 1846, *Loscos* (W); isolectotype (G).
- A. hispidum* var. *granatense* (Boiss. & Reut.) Willk. Ill. Fl. Hisp. & Balear. 1: 85, 86. 1882 (!); Suppl. Prodr. Fl. Hisp. 304. 1893.
- A. marisii* Cout. Bol. Soc. Brot. 25: 189. 1910. Holotype, Portugal, hab. in Beira meridional (Castello Branco) Malpica Baixo Alemtejo (Beja), *Maris s.n.* (COI, non vidi).
- A. hieronymii* Sennen, Bol. Soc. Arag. 15: 259. 1919 (!). Holotype, Spain, Castillo, Madrid, 15 Apr. 1915, *Jerónimo 2411* (BC, non vidi); isotype (BM, W).
- A. granatense* var. *weilleri* Emb. & Maire, Bull. Soc. Hist. Nat. Afr. Nord. 23: 164. 1932. Syntypes, North Africa, hab. in rupestribus cristallinis editis Anti-Atlantis ad Agadir-n-Tigfert, 1700–1800 m., 1931, *Weiller* (AL, non vidi); in Monte Fidoust, 2000–2200 m., 1931, *Weiller* (AL, non vidi).

Annual, with numerous erect or decumbent stems, up to 20 cm. long. *Leaves* linear-oblongate, lanceolate, or elliptic and oblong, 3–20(–25) × 1–3 mm., increasing in size upward, indumentum grayish-green, of adpressed stellate hairs. *Fruiting racemes* generally simple, elongated, 2–8 cm. long, densely fruited. *Pedicels* 2–4 mm. long, ascending to erect,

and adpressed to the main axis, indumentum dense and \pm strigose. *Sepals* persistent, 2–3.5 mm. long, with wide scarious wings, and often with apical tufts of furcate hairs. *Petals* clavate, gradually attenuate into claws (3)–4(–6) mm. long, emarginate, with dense strigose indumentum. *Filaments* very slender, edentate and unappendaged, 2–2.5 mm. long. *Fruits* orbicular, 3–5 mm. long and wide, emarginate; valves equally inflated at centers and with wide flattened margins, indumentum dimorphic of tuberculate, simple and furcate hairs, intermixed with adpressed few-rayed stellate hairs. *Styles* 0.5–1 mm. long, glabrous or with sparse basal indumentum. *Seeds* conspicuously winged. *Fl.* Feb.–Apr.

DISTRIBUTION AND HABITAT: cultivated and fallow lands, and dry mountain screes in eastern and southern Spain, Portugal, and North Africa! alt. 600–2200 m.

Portugal. *Sampaio* 2471 (BM). **Spain.** Aragonia, *Boissier s.n.* (G, W); Murcie, Sierra de Espuña, 1200–1400 m., *Jerónimo* 7101, 6715 (BM); Almeria, N. slopes of Sierra de Maria above Maria, *Ellman & Sandwith* (BM, GH, K); Pozuelo nr. Madrid, *Bucknell* (BM, E); *ibid.*, New Castile, 11 Apr. 1907, *White* (E); Prov. Valencia, Sierra de Espadán, 1800 m., *Reverchon* 21 (BM, E, G, K, W); Le Pozo, 1500 m., *Reverchon* 706 (W); Sierra de Alcaraz, 600–1000 m., 1890, *Porta & Rigo* (BM, G, W). **North Africa.** Maroc, Djebel Lalla Aziza, Ibrahim, 1883, *Cosson* (BM, E, G, K, W); Djebel Kerher, 850 m., *Sennen & Mauricio* 9237 (BM); Batna, 14 Mar. 1867, *Dukerley* (BM, GH, K); Nogen Atlas, Ain Kahta, 1850 m., *Jahandiez* 322 (BM, E, K, W); Algiers Sidi-bel-Abbés (nr. Oran) *Warion* 114 (BM, E, W); *ibid.*, 21 Apr. 1874, *Warion* (E, GH, K); Oran, *Balansa* 535 (BM, E, K, W); Médéa, 900 m., *Gay* 2395 (BM, G, GH, K).

The only other annual species of *Alyssum* occurring in the Iberian Peninsula and North Africa, and having dimorphic fruit indumentum and persistent sepals is *A. strigosum* (sect. ALYSSUM), which is frequently confused with *A. granatense* because of a similarity in habit and facies. The major differences between them are detailed in the following table:

	A. GRANATENSE	A. STRIGOSUM
LEAVES	Linear-ob lanceolate, lanceolate or elliptic-oblong, grayish-green with dense indumentum of adpressed and strongly branched elliptic hairs.	Oblanceolate, or broadly obovate-spathulate, greenish with \pm sparse indumentum, often strigose, of sparingly branched, or unbranched, stellate hairs.
PEDICELS	Ascending or erect, and often adpressed to main axis.	Widely divergent and patent, or horizontal.
SEPALs	Always persistent and erect, 2–3.5 mm. long, lanceolate, with \pm adpressed indumentum and apical tufts of strigose hairs.	When persistent, widely spreading, 1.5–2 mm. long, ovate-elliptic, with dense overall strigose indumentum.

PETALS	Emarginate with dense strigose indumentum, 4-6 × 1.5-2 mm.	Primarily bilobed, glabrous or with sparse adpressed indumentum, 2-3.5 × 0.4-1 mm.
FILAMENTS	Very slender and wingless, edentate, and unappendaged.	Always with wide wings, teeth, and connate appendages.
FRUITS	Orbicular, up to 5 × 5 mm., valves always equally inflated.	Orbicular or oblate, up to 6 × 7 mm., valves more or less unequally inflated.

From *Alyssum alyssoides*, the closest ally to *A. granatense* in section PSILONEMA, the latter is distinguished by its always larger floral parts, larger fruits, globose and reduced nectaries, erect and adpressed position of the pedicels, and the dimorphic fruit indumentum.

11. *Alyssum dasycarpum* Steph. ex Willd. Linn. Sp. Pl. ed. 4. 3(1): 469. 1800 (!). — Fenzl in Tchihatcheff, Asie Mineure Bot. 1(3): 314. 1866. — Boiss. Fl. Or. 1: 285. 1867. — Fedtschenko, Fl. Turkestan 47. 1906. — Busch in Kuznetsov, Busch & Fomin, Fl. Cauc. Crit. 3(4): 600. 1909; in Fl. U.R.S.S. 8: 358. 1939. — Popov, Man. Fl. Tashk., fasc. 1-2. fig. 221. 1923-1924. — Post & Dinsmore, Fl. Syr., Palest. & Sinai, ed. 2. 1: 88. 1932. — Bornmüller, Repert. Sp. Nov. Beih. 89(1): 58. 1936. — Thiébaud, Fl. Lib.-Syr. 1: 71. 1936. — Grossheim, Fl. Kavk. ed. 2. 4: 218. tab. 25, fig. 5. 1950. — Parsa, Fl. Iran 1: 742. fig. 616. 1952. — Karjagin in Fl. Azerbaid. 4: 274. 1953. — I. V. Pavlov (Ed.), Fl. Kazakh. 4: 282. tab. 35, fig. 9. 1961. — Dudley, Notes Bot. Gard. Edinb. 24(2): 157. fig. 1B. 1962. — Rech. Ark. Bot. 5(1): 168. 1963. — Ball & Dudley in Flora Europaea 1: 299. 1964. Holotype, Russia, in Siberia ad Kamam et Volgam fluvium, *Stephan s.n.* (LE, non vidi); isotypes (BM, G-DC, K).

Annual, with many erect stems, up to 25 cm. long, rarely prostrate. *Indumentum* ± dense, of coarse stellate hairs with long and few (but branched) rays, often appearing strigose. *Leaves* decreasing in size upward; the upper attenuate, obovate to oblong-ob lanceolate, 7-11(-25) × (2.5-)4-9 mm. the lower wide spatulate and short petiolate, 20-35 × 12-15 mm. *Inflorescence* racemose or paniculate, up to 15 cm. long, often branching widely. *Pedicels* (1.2-)1.5-2 mm. long, divergent to ascending, often subadpressed to the rachis, with dense strigose and dimorphic indumentum. *Sepals* 2-3 mm. long, ± persistent, with dense dimorphic and strigose indumentum. *Petals* obovate-spathulate, bifid or retuse, 2.5-3(-3.8) mm. long. *Filaments* 2-2.5 mm. long. *Fruits* elliptic-obovate or orbicular, truncate, 2.5-3(-4) × 2.5-3 mm.; valves equally inflated with thick flattened margins (ca. 1.5-2 mm. wide), and with dense dimorphic indumentum. *Styles* (1-)1.5-2 mm. long, stout, strongly dilated

at bases, and with dense dimorphic indumentum on the lower half. *Seeds* wingless. $2n = 16$. *Fl.* Mar.–June. Two varieties are recognized:

- A. Inflorescence elongate and many-flowered; plants erect; leaves oblanceolate to obovate. a. *Var. dasycarpum*.
 A. Inflorescence condensed, few-flowered; plants prostrate; leaves broadly spatulate. b. *Var. minus*.

a. *Var. dasycarpum*.

PL. II, FIGS. b, h. PL. III,
FIG. c. PL. IV, FIG. c.

Psilonema dasycarpum (Steph. ex Willd.) Meyer in Ledebour, *Fl. Alt.* 3: 150. 1831 (!); in Ledebour, *Fl. Ross.* 1: 127. 1842; *Ic. Pl. Fl. Russ.* 3: *tab.* 202. 1831. — Fedtschenko, *Fl. Ross. Austro-Orient.* 5: 44. *pl.* 388, *fig. B.* 1931.

Alyssum calycinoides Hausskn. in Bornmüller, *Repert. Sp. Nov. Beih.* 89(1): 58. 1936, *pro syn.* (!).

DISTRIBUTION AND HABITAT: widespread in disturbed and ruderal habitats, roadsides, fallow cultivated fields, vineyards, limestone ridges and screes, and steppe throughout southwestern Asia, including Caucasia, Turkey, Syria, Palestine, Iraq, Iran, Transcaspia, Afghanistan and Pakistan; alt. 100–2600 m.

Turkey. A2(E): Prov. Istanbul, Kalamiche, 7 June 1916, *Aznavour* (G); Serai-koi, *Frizaldzky s.n.* (WU). A4: Prov. Çankiri, valley of Çakmakli dere, 800–900 m., 1929, *Bornmüller 18860* (E, G, K), *13859* (BM, GH, K). A6: Prov. Tokat, Tokat, *Aucher 4096* (BM, G, K, OXF). A7: Prov. Gümüşane, Gümüşane, Guans nr. Sobran (Kovans), 1894, *Sintenis 6143* (BM, G, E, K, W); *ibid.*, 9 June 1862, *Bourgeau* (W). A8: Prov. Erzurum, Horasan nr. Hopik, 1600 m., *Davis 29378* (A, BM, E, K); *ibid.*, Beibout (Bayburt), May 1843, *Huet* (G). A/B8: Prov. Gümüşane Erzurum, Bayburt-Erzurum, valley of Kassuklu, 1524–1829 m., May 1853, *Huet* (BM, K). B3/4: Prov. Ankara, Ankara-Polatli, 40 km. from Sakarya, 13 km. SW. of Polatli, 720 m., *Huber-Morath 13732* (HM). B4: Prov. Ankara, Angoradur Monasteri, Ankara, 10 May 1907, *Frères E. C.* (G); *ibid.*, *Kotte 1019* (K); Prov. Konya, Yavsan Memlehasi, nr. Tuz Gölü, *Davis 18706* (E, K); Prov. Niğde Konya, Sultanhani-Cihanbeyli, 4 km. from Halkanli W. side of Tuz Gölü, 1000 m., *Dudley, D. 35927* (A, E). B5: Prov. Kayseri, Inceşu Develi, 3 km. S. of Inceşu, 1050 m., *Huber-Morath 10984* (HM); *ibid.*, Çalasse (Talas) nr. Kayseri, *Balansa 489* (G, W); *ibid.*, Erdschias dagh (Erciyas dağ), Lerca dağ nr. Kononia, 1600 m., May 1902, *Zedebour* (W); Prov. Kayseri Yozgat, Kayseri-Yozgat, Koprülü, 1200 m., 1890, *Bornmüller 1936* (BM). B6: Prov. Sivas, 4 km. W. of Sivas, 13 June 1939, *Reese* (HM). B7: Prov. Erzincan, Erzincan nr. Albuschikchan, 1890, *Sintenis 2176*, sub *A. calycinoides* (W); Prov. Erzurum, Erzurum, *Zohrab 375* (K). C2: Prov. Denizli, Tavas-Denizli, 800–900 m., *Dudley, D. 35560a* (A, E). C4: Prov. Konya, Konya, 4 June 1937, *Reese* (HM). C5: Prov. Niğde, Niğde-Ulukişla, S. side of pass, 47 km. from Ulukişla, 1450 m., *Huber-Morath 12818* (HM). C4: Prov. Konya, Konya, *Post 14* (G); *ibid.*, Çumra, Küçük köy, *Helbaek 2406* (E); *ibid.*, 4 km. from Konya, nr. Sille, 1040 m., *Huber-Morath 9277* (HM). Armenia, Erzurum-Tokat, *Aucher 4098B* (G); *ibid.*, *Aucher 4098A* (G, W); *Calvert & Zohrab 45-p.p.* (OXF). Anatolia, *Noë 947* (G). Syria. Hafar-

Syrian desert, 100 m., *Dinsmore* 20309 (E, K); Nebk, *Davis* 5527 (A, BM, E, K); Damascus, Learnid Atiyeh, *Post* 1109 (BM); Jebel Abur Rejmein, 2 May 1900, *Post* (BM, G, K); S. of Jarud, 180 m., *Dinsmore* 22478 (K). **Transjordan.** Above Wadi Musa, — Moan, 1219 m., *Davis* 8677 (A, BM, E, K); Ein Musa, 1372 m., *Davis* 8884 (BM, E, K). **Iraq.** 18 km. W. of Suleimani, 825 m., *Eig & Zohary* (HUI, non vidi); Moan, Moan-Ain Musa, 18 Apr. 1929, *Eig et al.* (G, W). **Kurdistan,** Ogulah, *Graham s.n.* (K). **Iran.** Bakhtiari, Oregon, Damane-Kuh range, 2300 m., *Wendelbo* 1726 (BG, E); Prov. Khorasan, Turbat-e-Haidari, 1300 m., *Rechinger* 4329 (G, W); *ibid.*, *Rechinger* 4362 (K, W); Robot Safid, 1800–2000 m., *Rechinger* 7336 (W); nr. Kaswin, 3 May 1882, *Polak* (E, G, W); *ibid.*, 1200 m., *Schmid* 5044 (G); *ibid.*, 1200–1300 m., 1902, *Bornmüller* 6233 (BM, G, W); Prov. Fars, Shiraz-Kazerun, *Gauba & Sabeti* 197 (W); Chiraz (Shiraz), *Aucher* 4091 (G, K, OXF); Shiraz-Persepolis, 800–1000 m., *Schmid* 5518 (G); Prov. Kerman/Fars, Saidabad-Cafut, 1900 m., *Rechinger* 3194 (G, W); Prov. Shahrud/Bustam, Khosh-Jaila, ca. 73 km. from Shahrud, 2000–2200 m., *Rechinger* 5442 (G, W); Prov. Hamadan, Aq Bulaq, ca. 100 km. N. of Hamadan, *Rioux & Golvan* 212 (W); Abedeh-Daulatabad, 1500–2000 m., *Schmid* 5323 (W); 5 miles N. of Daulatabad, 1372 m., *Cowan & Darlington* 1096 (K); Mt. Elburs, Keredj, *Rechinger* 244 (K, W); Scharabad, May 1858, *Bunge* (G, GH, K); *Tabriz*, *Gilliat-Smith* 1773–1782 (K); Keredj, 16 May 1934, *Gauba* (W); Emirabad, nr. Ibrahirabad, 1829 m., *Cowan & Darlington* 588 (K); 10 miles E. of Zorab, 1219 m., *idem* 1775 (K); 20 miles W. of Zorab, *idem* 1734 (K); Sultanabad, 1524 m., *Lindsay* 31 (BM); Ispahan, *Aucher* 4091A (G, K, W); Ispahan-Teheran, May 1859, *Bunge* (G); Transcaspian, Aschabad, Annaju-Gjaurs, 1900, *Sintenis* 51 (BM, G, GH, E, K, W); Persia, 1825, *Belanger* (G); *ibid.*, *Kotschy* 183 (G). **Afghanistan.** Herat, 1100 m., *Köie* 4163 (W); Obek, 1600 m., *Köie* 4164 (W); Kabul, Kabul-Tangi Gharu, 1700 m., *Gilli* 1076 (W); E. of Kabul, Budchak, 1770 m., *Gilli* 1075 (W); Prov. Bamian, Band-i-Amir, Lake Band-i-Panir, 2800 m., *Rechinger* 18394 (W); 2800–2900 m., *Rechinger* 18226 (W); *Wendelbo* 4783 (BG, E); 2900 m., *Wendelbo* 4761 (BG, E); 3200 m., *Volk* 2767 (W). **Afghanistan/Iran.** Hari Reid Valley-Khorasan, *Aitchison* 194 (BM, G, GH, E, K); Jouvnal-Sinab, *Griffith* 299 (K); *Griffith* 1366 (K, W). **Baluchistan.** Peskin, 1525 m., *Lace* 3574 (E, K); 1600 m., 17 Apr. 1888, *Lace* (E); W. Baluchistan, Ziaret, 2338, *Stewart* 28087 (MICH); Nichara, *Stocks* 910 (K). **Russia.** Caucasus, *Bunge* 75 (K, W); *ibid.*, Talüschr nr. Swant, *Meyer* 1601 (G, K); *ibid.*, 9 May 1947, *Grubner* (BM); *ibid.*, nr. Codshadoi, Swant, June 1838, *Hohenacker* (BM, G, GH, K); nr. Khabadian, 610–914 m., 1883, *Regel*, *p.p.* (BM); Transcaucasus, Nachitschevan, dist. Dzulfa, Darry-Dagh-Dzhulfa, Apr. 1934, *Karjagin* (A); Erivan, *Buhse* 118 (G, W); Azerbaidjan, dist. Salma, Dehrman, 2 Apr. 1828, *Szovits* (G); Turkistan, Chuma, *Karoliff & Krause s.n.* (G); Transcaspian, Kisil Arsah, 1885, *Becker* (K, W); in deserto Caspio, *Pallas s.n.* (BM); Caspium nr. Astrachan, 1819, *Fischer* (G-DC, K); Astrachan, 1820, *Steven* (G-DC); Soviet Armenia, Kotairk region, Vokhchabad, Darabulal, 26 May 1956, *Mulkidzhanyan* (BM, E); Vedi region, Arazdian-Kiarki, 29 June 1960, *Takhtajan et al.* (BM, W); Kazakh S.S.R., Prov. Syr-Dariia, Perovsk, Akkum Tashk. desert, 11 May 1916, *Tsintserling* (A); Prov. Semiretschensk, Karatal river, 4 May 1902, *Saposhnikov* (BM, GH); Turkmenian S.S.R., dist. Krasbovodsk, steppe nr. Kizil Arvat, *Androsov* 2565 (GH); Siberia, Songarei, *Schrenk s.n.* (G, GH); Soongoro-Kirghisici, nr. Ajagus, *Karelin & Kiriloff* 73 (BM, E, GH, K); Siberia, *Pallas s.n.* (BM); Altai, *Ledebour* 302 (G, W); *ibid.*, *Politons s.n.* (E, W); Russia/China, Songaria Chin. Lake Saisang-Nor, *Meyer s.n.* (E, GH, K, W).

From all the other oriental species in section PSILONEMA, *Alyssum dasycarpum* may be distinguished by the dimorphic and strigose fruit indumentum, longer and basally dilated styles, and wingless seeds. The always orbicular fruits of *A. granatense* from the Iberian Peninsula and North Africa are at least twice the size of those of *A. dasycarpum*. Also, the tuberculate hairs on the fruits of the western European species are sparser and longer, resembling more those of *A. hirsutum* (sect. ALYSSUM). *Alyssum strigosum* (sect. ALYSSUM) is sometimes confused with *A. dasycarpum* because of the similar dimorphic fruit indumentum. However, the fruits of *A. strigosum* are larger and are covered with longer furcate hairs. In addition, the winged, dentate and appendaged filaments, larger floral parts, winged seeds, and widely divergent pedicels are diagnostic for *A. strigosum*. No specimens which have winged seeds have been found throughout the range of *A. dasycarpum*. A plausible explanation for the Ukrainian *A. dasycarpum* var. *pterospermum* (Bordz. Bull. Jard. Bot. Kiev 7-8: 17. 1928) is that unless the seeds are examined under magnification, the lighter colored and often translucent radicle may be misinterpreted as a wing formation.

- b. Var. *minus* Bornm. ex Dudley, Notes Bot. Gard. Edinb. 23(2): 157. fig. 1A. 1962 (!). Holotype, Iran, inter Ispahan et Hamadan, ad pagum Mohammedi, 1800 m., 17 Mar. 1892, *Bornmüller* 2174 (E); isotypes (BM, G, K, OXF, W).

DISTRIBUTION AND HABITAT: a scattered and limited distribution in desert and fallow lands, and stony hillsides of Syria and Iran.

Syria. Nebk-Quaryatein, 5 Apr. 1890, *Post* (BM). Iran. Ispahan-Yesd nr. Bambis, 1900 m., 1892, *Bornmüller* 2173 (G); nr. Kom, 1100 m., 1892, *Bornmüller* 2175 (BM, E, G, K, OXF, W); nr. Dalechi, *Kotschy* 181 (BM, G-p.p., K, W); Uenak ne. Teheran, *Kotschy* 64 (G, W); Karawanseri, Kaswin, 30 Apr. 1892, *Pichler* (G, K, W); nr. Kaswin (Mazraeh), 1200 m., *Schmid* 5048 (W); *ibid.*, *Schmid* 5007 (G); S. of Tabriz, *Gilliat-Smith* 1356, 1381, 1783 (K).

Intermediate between the varieties of *A. dasycarpum*: Iran. Prov. Kerman, Kerman-Sultanabad, Sirdjian (Saidabad), Mashiz-Khan-e-Sorck, 2000-2580 m., *Rechinger* 3006 (G, W).

12. *Alyssum homalocarpum* (Fischer & Meyer) Boiss. Fl. Or. 1: 285. 1867 (!). — Muschler, A Manual Flora of Egypt 1: 422. 1912. — Post & Dinsmore, Fl. Syr. Pal. & Sinai, ed. 2. 1: 87. 1932. — Burt & Lewis, Kew Bull. 3: 283. 1949. — Parsa, Fl. Iran. 1: 744. 1952. — Montasir & Hassib, Ill. Man. Fl. Egypt 157. 1956. — Jafri, Notes Bot. Gard. Edinb. 22: 95. 1956. — Rech. Bot. Not. 115: 37. 1962; Ark. Bot. 5(1): 169. fig. 14. 1963. — Dudley in Rech. Fl. Lowland Iraq 306. 1964.

Psilonema homalocarpum Fischer & Meyer, Ind. Sem. Hort. Petrop. 6: 63. 1840 (!). Holotype, semina in Arabia Petraea, May 1837, *Schimper* (LE, non vidi — cultivated in Hortus Petropolitanus from seed collected by

Schimper). Authentic specimens (ex hb. Gay) cultivated (1837) in Jardin Luxembourg from the same seed collection have been examined in the herbaria of G, GH, and K.

Alyssum horebicum Boiss. Ann. Sci. Nat. Paris, II. 17: 156. 1842 (!). Holotype, Sinai, Mt. Horeb, *Aucher* 257 (P, non vidi); isotype (G).

Alyssum musili Velen. Sitz-ber. Böhm. Ges. Wissen. Prag 11: 13. 1911 (!). — Velen. Repert. Sp. Nov. 13: 25. 1913. Holotype, Arabia, in distr. Harara et Wudijan, Drejheme et Zerko, 1909, *Musil* (PRC).

Alyssum nomismocarpum Rech., Aellan & Esfand. Phytion 3: 56. 1951 (!). Holotype, Persia, Prov. Lars, Hadjiabad prope Tarum, in declivibus siccis saxosis, ca. 900 m., 29 Apr. 1948, *Rechinger et al.* 3272 (W); isotypes (E, G, K).

Annual, with numerous, erect but brittle stems, 5–20 cm. long. *Leaves* oblong-spathulate, 1–4(–5) × (0.5–)1–3 cm., acute, minutely denticulate above the middle, indumentum dense and ashy, of stellate hairs with ± divergent and long rays. *Inflorescence* corymbose, 4–10 cm. long with numerous patent or ascending fragile branches. *Pedicels* 1.3–2 mm. long, horizontal, with sparse indumentum. *Sepals* deciduous, 0.8–1 mm. long, with dense ashy indumentum of ± long-rayed stellate hairs. *Petals* linear-cuneate, subemarginate or entire, 0.5–1 mm. × 0.2–0.5 mm., glabrous. *Filaments* subulate, edentate, ca. 1 mm. long. *Fruits* broadly obovate, truncate, glabrous, 3–7 mm. long and wide, margins prominently papillose, and coloring reddish-purple when dry; valves equally inflated, with conspicuous venation. *Styles* 0.5–0.7 (–1) mm. long, dilated basally. *Seeds* narrowly winged. *Fl.* Feb.–Apr.

DISTRIBUTION AND HABITAT: a Saharo-Sindian species of dry silty river beds, limestone and sandy slopes, basaltic scree, sandstone, desert and calcareous cultivated lands in Egypt, Saudi Arabia, Kuwait, Palestine, Iraq, Iran, and West Pakistan; alt. (120–)200–1000(–1600) m.

Egypt. Mergheb, May 1904, *Muschler* (K); Ouadi Aschar (Wadi Isleh), 1903, *Muschler* (G); nr. Belbeyi, 1837, *Schubert* (K). **Saudi Arabia.** Arabian desert, *Schweinfurth* 127 (K); Galalah, *Schweinfurth* 8 (G); Talpine camp-Hafarol Batin, 240 m., *Dickson* 576 (K); ul-Arîsh, *Figari* (FI, non vidi). **Kuwait.** Batin-Mahazul, 100 miles W. of Kuwait, 120 m., *Dickson* 511 (K); Wady Batin, 1219 m., *Fitzgerald* 15610/3 (BM). **Syria.** Jabal-Tenf, *Gombault* 1642 (P, non vidi). **Jordan.** Naqb Ishtar, *Hunting Aero Survey* 16 (E). **Palestine.** 40 km. S. of Maan, 1929, *Eig & Zohary* (HUJ, non vidi). **Iraq.** ca. 400 km. W. of Baghdad, 1933, *idem* (HUJ, non vidi); Rutba-Ramadi, 15 km. from Rutba, 750 m., *Rechinger* 9894 (W); 10 km. SW. of Rutba, 500 m. *Rawi* 21047 (K); 18 km. S. of Rutba, 640 m., *Rawi* 14637 & 14899 (K); dist. Diwaniya, 40 km. WNW. of Shabicha, 380 m., *Rechinger* 13642 (W); Shabicha, 200 m., *Gillett & Rawi* 6276 (K); Sharaban (Shabicha), Beluchi, Aug. 1886, *Jennings* (K); 40 km. NW. of Shabicha, 390 m., *Guest, Rawi & Rechinger* 19306A (K); As-Salman, nr. Ansab, 145 km. SE. of As-Salam (Southern desert, ad confines Saudi Arabia) 340 m., *Rechinger* 13810 (W); 62 km. WNW. of Ansab, 135 km. SSW. of As-Salman, 360 m., *Rechinger* 13781 (W); Darb Al' Haj, Saddi border, 360 m. *Guest, Rawi & Rechinger* 19083 (K); 12 km. ESE. of As-Salman, 240 m.,

idem 18739 (κ); nr. Ansab, 145 km. S. of As-Salman, *idem* 1893 (κ). Iran.¹ Shershah, Mar. 1859, *Bunge* (G, κ); Prov. Baluchistan, nr. Zahedan, 600 m., *Gauba & Sabeti* 196 (w); Montes Karvandar-Khash (Vasht or Kwash), Iran-shahr (Bampur), 1500–1600 m., *Rechinger et al.* 3958 (w). West Pakistan. North Baluchistan, 1902, *Landon* (BM).

This is the only glabrous-fruited representative of section PSILONEMA having deciduous sepals, and it is the only *Alyssum* with minute teeth towards the apices of the leaves. Rechinger (loc. cit.) notes and illustrates the papillose fruit margins of *A. homalocarpum*. This character, although rare in the genus, is not unique. A Greek endemic, *A. euboicum* (sect. ODONTARRHENA) also has fruits, the margins of which are papillose, especially towards the apices. The fruit size of *A. homalocarpum* varies considerably; the smallest measure circa 3×3 mm., and the largest 7×7 mm., but without any apparent geographical pattern. None of the characters said to distinguish *A. nomismocarpum* from *A. homalocarpum*, i.e., longer racemes, fragile stems, larger fruits, and shorter pedicels, indicates a satisfactory specific separation when the entire range of morphological variation is taken into consideration. Similarly, *A. musili* and *A. horebicum* do not possess sufficient discontinuities to separate them from *A. homalocarpum*.

EXPLANATION OF PLATES

PLATE I

Alyssum blepharocarpum: Holotype, *Huber-Morath* 13722 (HM).

PLATE II

FIGS. a–g. Petal types, $\times 20$: a, *Alyssum desertorum* var. *desertorum* (*Davis* 27622); b, *A. dasycarpum* var. *dasycarpum* (*Davis* 29378); c, *A. pinifolium* (*Kirk*); d, *A. minutum* (*Davis* 18940); e, *A. stapfii* (*Davis* 28694); f, *A. lepidotum* (*Davis* 18391a); g, *A. pseudo-mouradicum* (*Davis* 38893).

FIGS. h–r. Long filament types, $\times 20$: h, *Alyssum dasycarpum* var. *dasycarpum* (*Davis* 29378); i, *A. huetii* (*Dudley*, *D.* 35230); j, *A. minutum* (*Davis* 18940); k, *A. xanthocarpum* (*Davis* 19411); l, *A. lepidotum* (*Davis* 18391a); m, *A. aizoides* (*Davis* 20328); n, *A. strictum* (*Sintenis* 5614); o, *A. repens* var. *trichostachyum* (*Davis* 30295); p, *A. filiforme* (*Davis* 29072); q, *A. giosnanum* (*Kühne* 1381); r, *A. pinifolium* (*Kirk*).

FIGS. s–y. Short filament types, $\times 20$: s, *Alyssum huetii* (*Dudley*, *D.* 35230); t, *A. sibirnyi* (*Dudley*, *D.* 34558); u, *A. pseudo-mouradicum* (*Davis* 38893); v, *A. corningii* (*Siehe* 241); w, *A. minutum* (*Davis* 18940); x, *A. desertorum* var. *desertorum* (*Davis* 27622); y, *A. strigosum* subsp. *strigosum* (*Dudley*, *D.* 34638).

¹ Parsa, in his *Fl. de l'Iran* 1: 745. 1952, records *Alyssum homalocarpum* from the Shah Sam de Lut desert of Iran, and indicates that the original publication of this record is to be found on page 326 of the Bornmüller paper titled "Aus der Pflanzenwelt des inner-Iranischen Wüstengürtels" (*Repert. Sp. Nov.* 40: 1936). Bornmüller, however, does not mention *A. homalocarpum*, or in fact, any species of *Alyssum* in that particular paper.

PLATE III

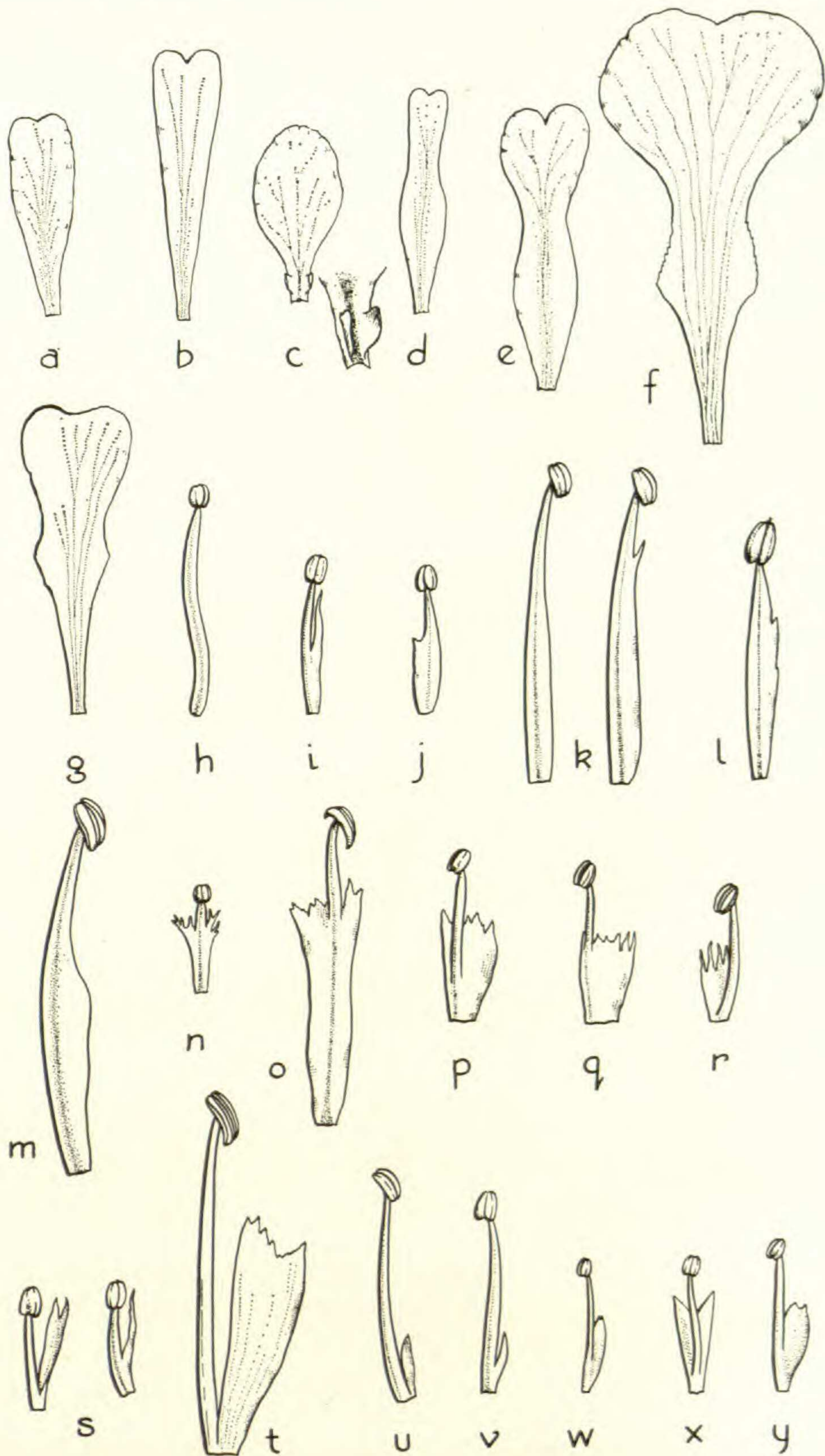
Fruit types, $\times 8$: a, *Alyssum huetii* (Dudley, D. 35230); b, *A. desertorum* var. *desertorum* (Davis 27622); c, *A. dasycarpum* var. *dasycarpum* (Davis 29378); d, *A. xanthocarpum* (Davis 19411); e, *A. aurantiacum* (Davis 16192); f, *A. hirsutum* (Prescott); g, *A. szowitsianum* (Dudley, D. 35210a); h, *A. pseudo-mouradicum* (Davis 38893); i, *A. corsicum* (Davis 13283); j, *A. filiforme* (Davis 31609); k, *A. haussknechtii* (Davis 20351); l, *A. sibiricum* (Dudley, D. 35860); m, *A. murale* var. *murale* (Dudley, D. 35551); n, *A. cassium* (Kühne 1446); o, *A. crenulatum* (Pinard); p, *A. floribundum* (Dudley, D. 36151).

PLATE IV

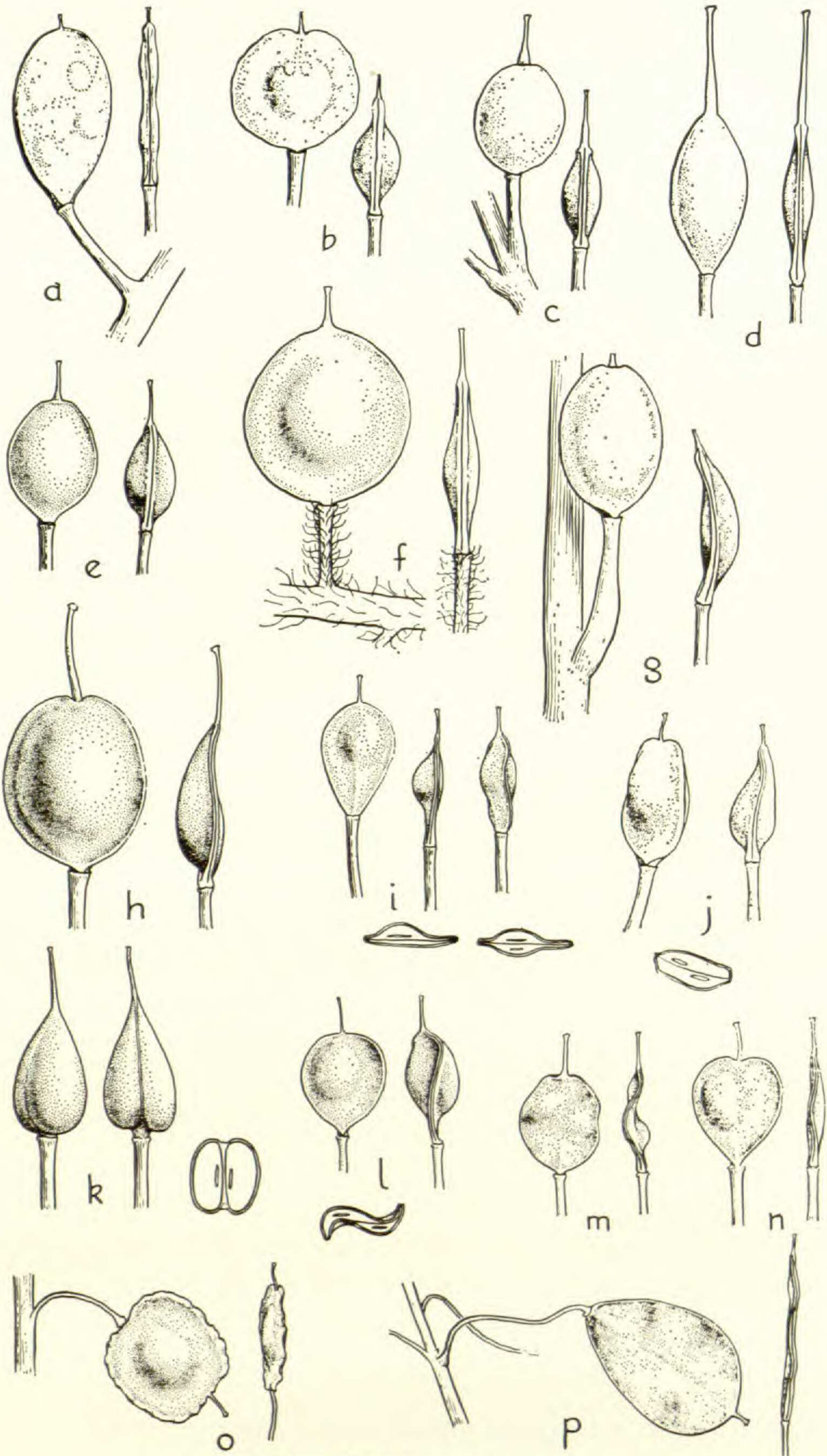
Hair types: a, *Alyssum chondrogynum* (Davis 3083), from the fruit, $\times 200$; b, *A. huetii* (Dudley, D. 35230), from the fruit, $\times 200$; c, *A. stapfii* (Davis 28694), from the fruit, $\times 50$; d, *A. xanthocarpum* (Davis 19411), from the lower leaf surface, $\times 50$; e, *A. pseudo-mouradicum* (Davis 38893), from the upper surface of sterile shoot leaf, $\times 50$; f, *A. eriophyllum* (Haussknecht), from leaf of sterile shoot, $\times 50$; g, *A. strigosum* subsp. *strigosum* (Dudley, D. 34638), from the stem, $\times 50$; h, *A. strigosum* subsp. *strigosum* (Dudley, D. 34638), from the fruit, $\times 50$; i, *A. hirsutum* (Prescott), from the fruit, $\times 50$; j, *A. corsicum* (Dudley, D. 33283), from the lower surface of sterile shoot leaf, $\times 50$; k, *A. stibrnyi* (Dudley, D. 34558), from upper surface of cauline leaf, $\times 50$; l, *A. aizoides* (Davis 20328), from upper surface of basal cauline leaf, $\times 50$; m, *A. mouradicum* (Balls 186), from lower surface of basal cauline leaf, $\times 50$; n, *A. szowitsianum* (Dudley, D. 35210a), from fruit, $\times 50$.



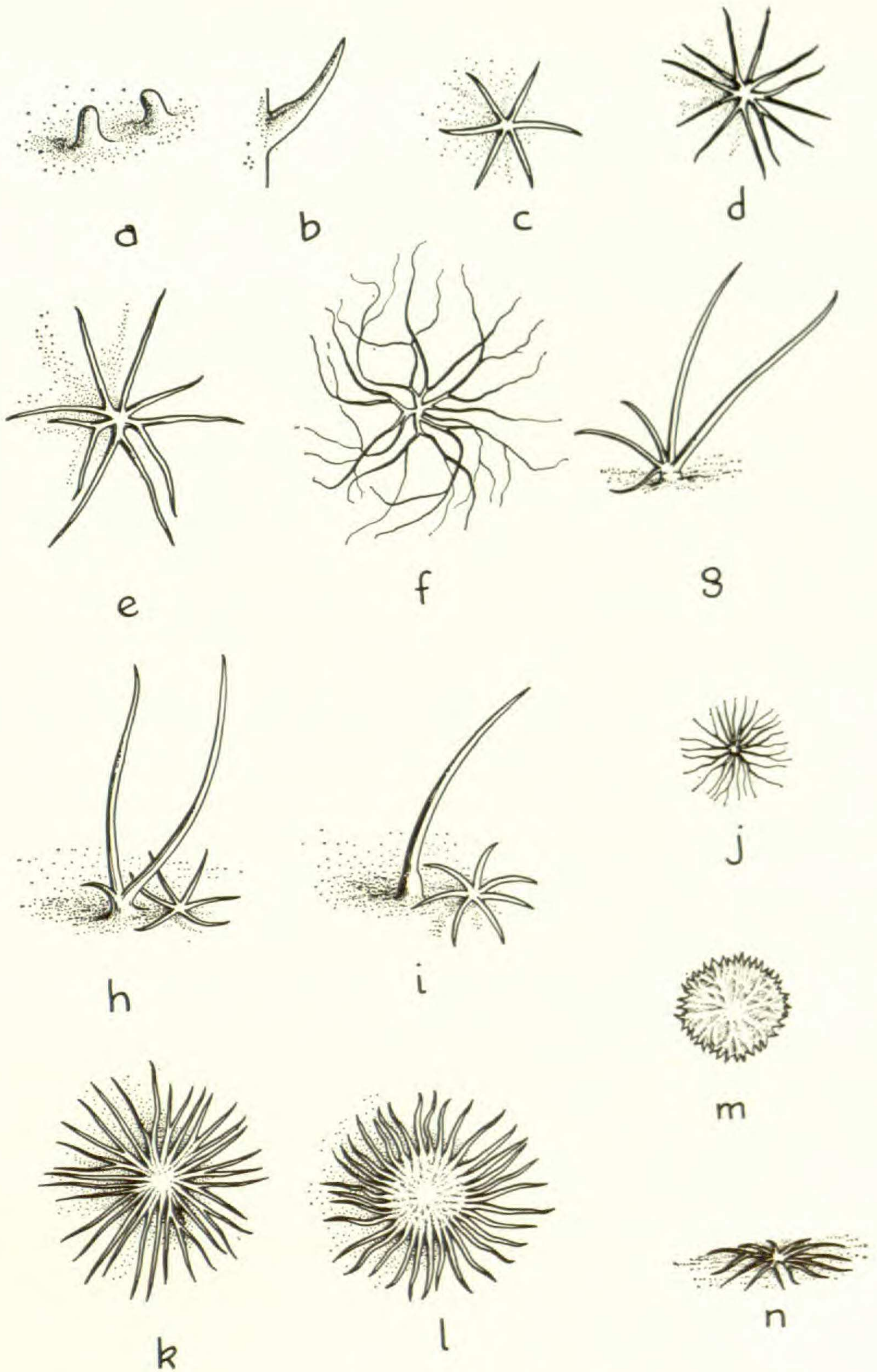
DUDLEY, STUDIES IN ALYSSUM



DUDLEY, STUDIES IN ALYSSUM



DUDLEY, STUDIES IN ALYSSUM



DUDLEY, STUDIES IN ALYSSUM

THE GENERA OF VALERIANACEAE AND DIPSACACEAE
IN THE SOUTHEASTERN UNITED STATES ¹

I. K. FERGUSON

VALERIANACEAE Batsch, Tab. Affin. Reg. Veg. 227. 1802, nom. cons.
(VALERIAN FAMILY)

Annual or perennial herbs, sometimes woody at base. Leaves in basal rosettes or opposite, pinnately divided or entire, exstipulate, the bases often sheathing. Inflorescence a monochasium, thyrse, or many-flowered compound dichasial cyme, sometimes condensed and capitate, bracteate and bracteolate [ebracteolate]. Flowers irregular or almost regular, bisexual or unisexual. Calyx obsolete or developing late and becoming conspicuous only in fruit, annular [or toothed], adnate to ovary. Corolla tubular, 5[3 or 4]-lobed, imbricate, often basally spurred or saccate [bilabiate]. Stamens epipetalous and alternate with the corolla lobes, varying in number, usually 3 in our genera [1, 2, 3, or 4]; anthers versatile, 2- or 4-lobed, 4-locular, introrse, dehiscent longitudinally; pollen tricolpate, echinate. Gynoecium syncarpous, ovary inferior, 3-locular, with two locules usually suppressed and one fertile, with a solitary, pendulous, anatropous ovule; style 1, stigma simple or lobed. Fruit dry, indehiscent, the calyx often developing into a winged, awned, or plumose pappus. Seed 1; endosperm absent; embryo large, straight, the cotyledons oblong, the radicle superior. TYPE GENUS: *Valeriana* L.

A family of about ten genera and 370–400 species, widely distributed but occurring mainly in the North Temperate regions and absent from Australasia; three genera native and one introduced in North America; two genera in our area.

Valerianaceae are a natural family closely related to Dipsacaceae but

¹ Prepared for a generic flora of the southeastern United States, a joint project of the Arnold Arboretum and the Gray Herbarium of Harvard University made possible through the support of George R. Cooley and the National Science Foundation and under the direction of Carroll E. Wood, Jr., and Reed C. Rollins. This treatment follows the pattern established in the first paper in the series (Jour. Arnold Arb. 39: 296–346. 1958) and continued through those in volumes 40–46 (1959–1965). The area covered is bounded by and includes North Carolina, Tennessee, Arkansas, and Louisiana. The descriptions are based primarily on the plants of this area, with any supplementary material in brackets. References which the author has not seen are marked by an asterisk.

The author is indebted to Dr. Wood for his aid and valuable criticisms; to Dr. George K. Brizicky, for his guidance and suggestions; and to Mrs. Gordon W. Dillon, for her help in the preparation of the typescript.

distinguished by the 3-locular ovary (one locule fertile), cymose inflorescences, and seeds without endosperm. The family also has affinities with the Caprifoliaceae and Rubiaceae.

Members of the family often have a very characteristic unpleasant odor. Volatile oils occurring mainly in the root and rhizome have been investigated extensively, especially in *Valeriana*.

The cytogenetics of the family have not been very fully investigated, although chromosome numbers for some species of *Valeriana* (21 species of 300) and *Valerianella* (11 species of 60) are available. However, only a few chromosome counts are reported for four additional genera: *Centranthus*, $2n = 14, 32$ (three species); *Fedia*, $2n = 32$ (one species); *Patrina*, $2n = 22$ (one species); and *Astrephia*, $2n = 32$ (one species).

The family is of little economic importance. A few members, among them *Centranthus ruber* (red valerian) and *Valeriana officinalis* (garden heliotrope or common valerian), are grown as ornamentals. The latter is used as a source of the drug "valerian." Corn salad (*Valerianella Locusta*), as its name implies, is used in salads. Spikenard (*Nardostachys Jatamansi*) yields an oil which has been used in perfumery in the East.

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